EXCAVATING ENGINEER

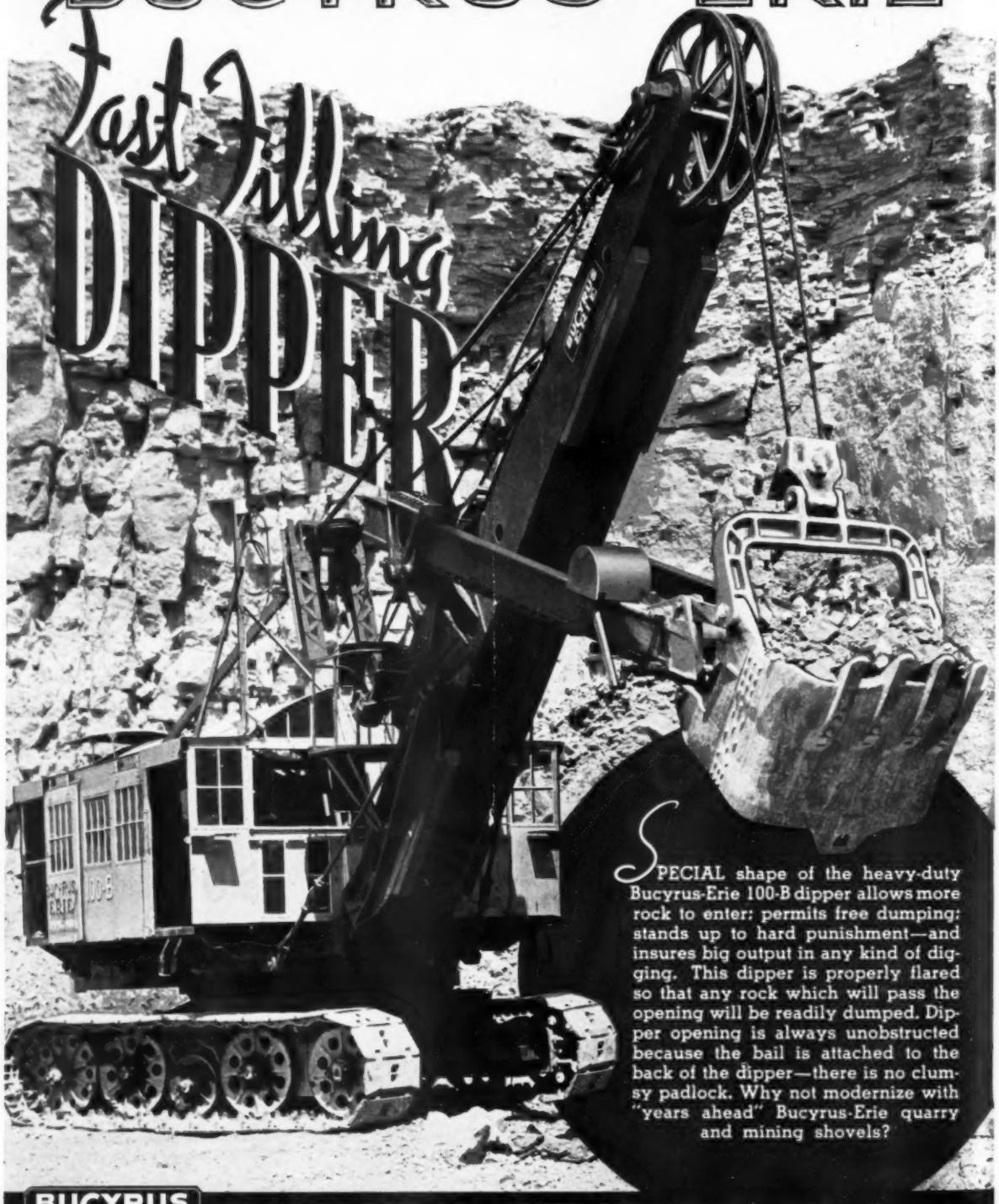
FOUNDED 1905

With a special 110-foot boom, this crane set the top span of the "Triumphal Arch" 186 feet above the ground of Treasure Island, site of the 1939 Golden Gate Exposition.
GUY F. ATKINSON CO.
No. 2

May 1938

BUCYRUS-ERIE

Fast Filling DIPPER



SPECIAL shape of the heavy-duty Bucyrus-Erie 100-B dipper allows more rock to enter: permits free dumping: stands up to hard punishment—and insures big output in any kind of digging. This dipper is properly flared so that any rock which will pass the opening will be readily dumped. Dipper opening is always unobstructed because the bail is attached to the back of the dipper—there is no clumsy padlock. Why not modernize with "years ahead" Bucyrus-Erie quarry and mining shovels?

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Excavating, Drilling, and Material Handling Equipment

EXCAVATING
ENGINEER

Vol. XXXII **May, 1938** No. 5

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LOOKING AHEAD

These interesting articles will appear in an early issue of EXCAVATING engineer. Watch for them.

Nothing Is Impossible

William Z. Williams bets he can dig a hole, and finds himself mixed up with quicksand, a maniac, and sundry other obstacles. Can you guess who wins the bet?

Limestone Loading

Kentucky Stone Company handles loading problem at Irvington, Kentucky, quarry with ⅝-yard shovel.

Horseshoe Stripping

Marish Hill Super Block Coal Company takes out high grade block coal from horseshoe-shaped pit. Walking dragline handles stripping.

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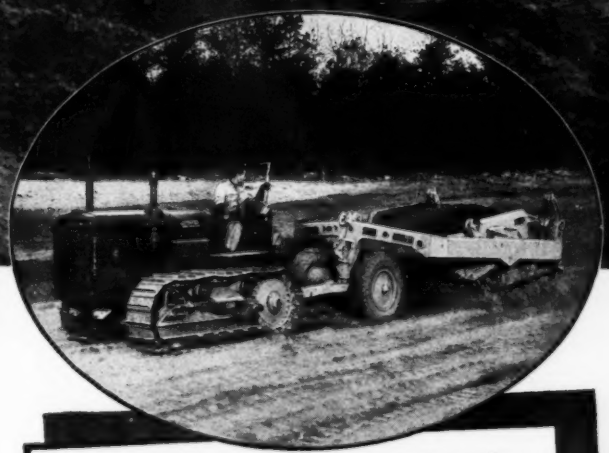
This McDonald Experience Proves INTERNATIONAL Efficiency



ABOVE: This gives an idea of the soft ground over which the six International TD-40 Diesel TracTracTors travel most of the time on this job. Two of the units are shown here working with a scraper and a bulldozer. AT RIGHT: *Another Model TD-40 TracTracTor and scraper moving between 55 and 60 cubic yards an hour.*

Six International TD-40 Diesel TracTracTors are doing a large share of the excavating for the William P. McDonald Construction Company of Flushing, N. Y., on 4½ miles of new highway near the eastern end of Long Island. Four of these Internationals are operating 4½-yard, 4-wheel scrapers on this job. The other two, one equipped with a bulldozer and the other with a bullgrader, are on grading work.

It was originally planned to let tractors and scrapers open up the work and then turn over the main excavation to other equipment. In a thorough five-day test, however, two International TD-40 Diesel TracTracTors proved so efficient on scraper work that the other four were purchased and the major part of the dirt moving given to them.

The facts and figures gathered by this nationally known construction company prove the value of International Diesel TracTracTors on the job. Our nearby International industrial power dealer or Company-owned branch can give you additional information on this model, and on other crawler and wheel tractors, and power units in the International line.

INTERNATIONAL HARVESTER COMPANY
(INCORPORATED)
180 North Michigan Avenue Chicago, Illinois

Five-Day Test on Internationals Your Guide to Efficient Power

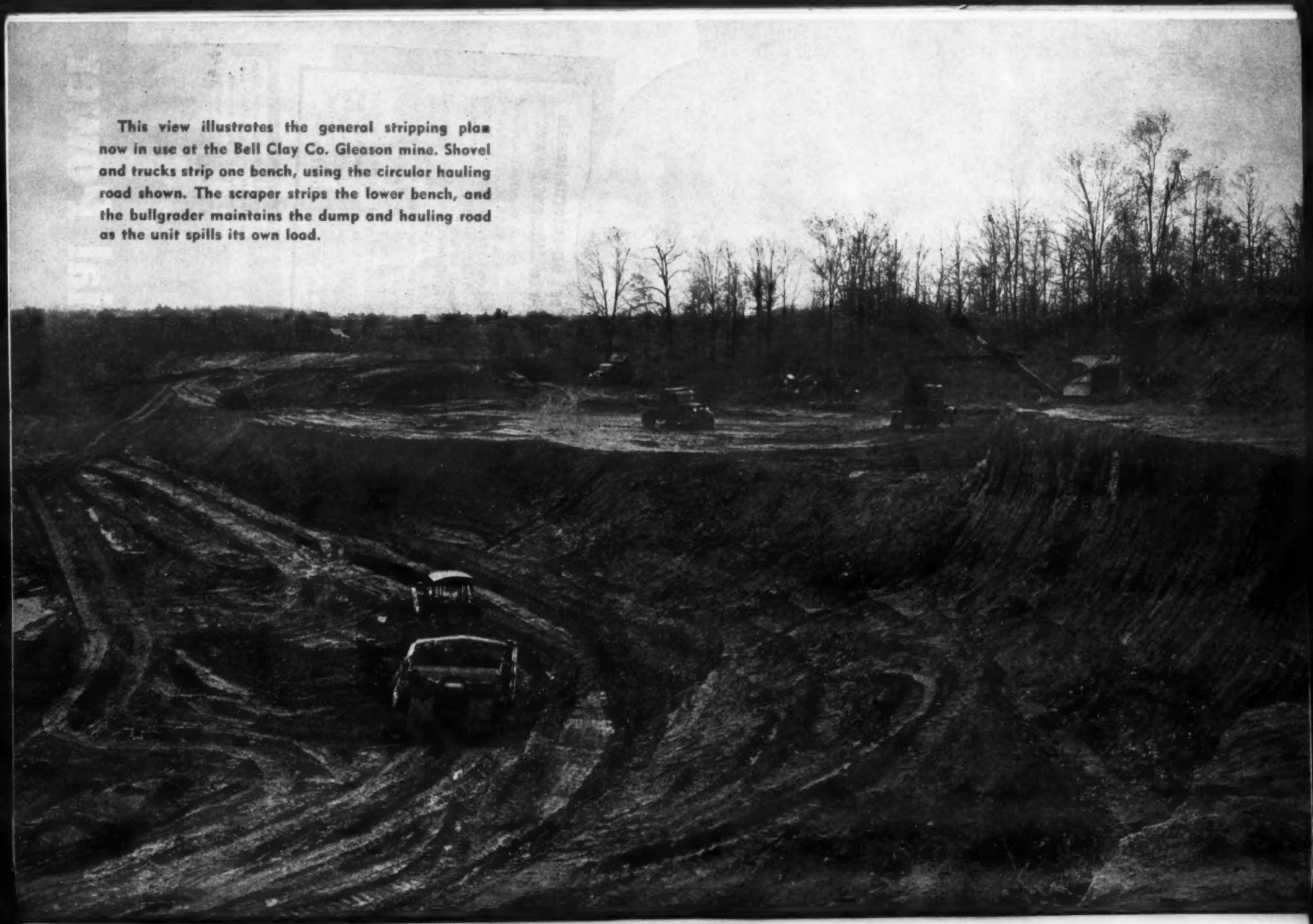
★ One International Diesel TracTracTor moved 1,951½ cubic yards in 34.75 hours, averaging 56.2 yards per hour on an average haul of 524 feet. Average load was 4.11 yards and an average of 13.65 trips were made an hour.

★ The second unit, identical with the first, moved 2,061½ cubic yards in 34.25 hours, averaging 60.3 yards per hour on an average haul of 514 feet. Average load was 4.25 yards and an average of 14.15 trips were made an hour.

★ Their flexibility and travel speeds on scraper work, their correct balance and absence of unnecessary weight, the remarkable performance of the Diesel engine, and a minimum of "time-out" for maintenance won this job for TracTracTors.

Speed and Efficiency—two Internationals working side by side powering 4½-yard scrapers.

INTERNATIONAL Industrial Power



This view illustrates the general stripping plan now in use at the Bell Clay Co. Gleason mine. Shovel and trucks strip one bench, using the circular hauling road shown. The scraper strips the lower bench, and the bullgrader maintains the dump and hauling road as the unit spills its own load.

2½ Cents A Yard

Combination scraper and bullgrader proves "multi-useful" in cutting stripping costs for Bell Clay Company

AT ITS ball clay mine in Gleason, Tennessee, the Bell Clay Company is stripping 50 feet of overburden in preparation for the summer loading season. Because of the importance of keeping the high-grade clay absolutely pure, from bank to customer, actual loading is done only in the dry summer months. Year 'round stripping operations leave a protective "blanket" of lignite and sand over the clay until immediately before loading.

Until February, 1938, operations at this mine were conducted by three shovels, as described in the September, 1937 issue of Excavating Engineer. On February 21, the company put the new "handy-man" tractor equipment into service, supplementing the shovels and trucks. As shown in

● The grader extends the edge of the dump; the load in the scraper will be "scattered" to fill in a low place on the dump.

● Having dumped the scraper load, the tractor operator grades off a load dumped previously by a truck. On his next round he'll take care of the dirt just "spilled" by the truck behind him.

the accompanying pictures, the unit is composed of a bullgrader mounted on an International TD40 TracTracTor which pulls a 4½-yard, 4-wheel Bucyrus-Erie scraper.

Four Yards Per Trip

From February 21 through March 30, the unit actually operated a total of 646½ hours, with 16 hours of this given over to blading with the scraper cut off from the tractor. A total of 5881 loads were carried by the scraper on an average haul of 1000 feet. Total yardage was 23,524, bank measure, which gives an average per trip of 4 cubic yards, bank measure. Material handled is a sticky red sand.

The tractor used 1619 gallons of Diesel fuel, or an average of about 2.5 gallons per hour. Oil was changed every 60 hours, with none being added between changes except as was necessitated by two oil line breaks. Altogether, a total of 203 quarts of oil and 320 pounds of grease were used during the period.

Total cost per yard for dirt moved by the scraper was about 2.5 cents. This is operating cost, incuding operator's wages and repairs but not including any indirect costs.

Maintenance System Keeps Down Costs

The tractor unit is operated 21 hours per day, six days a week, on two shifts. The day shift runs 10 hours, and the night shift, 11. Every other day, the day operator cleans the filters. From 5:30 to 6:30 A.M. and from 5 to 6 P.M. every day, a greasing crew "moves in" and greases the unit. Every Sunday, bullgrader, tractor and scraper are washed and thoroughly inspected. The weekly washing not only fits in with the Bell Company policy of keeping all equipment looking tip-top, but insures that the inspection will bring any breakage or trouble to light before it has time to become serious. The Sunday work also includes such regular maintenance details as tightening cats, etc.

There are two distinct and uniform clay strata at this mine, the top one averaging four feet in depth, and the lower one, five feet. The clay is overlaid by two or three feet of lignite. Above this is 50 to 60 feet of sticky red sand, capped by a layer of dirt top soil. The three- or four- bench stripping method described in the previous article is still used, so only the modifications resulting from the introduction of bullgrader and scraper will be outlined here.

Operating Layout

The day the mine was visited, the only one of the three shovels working was the ⅝-yard 19-B. This rig, loading to four 1½-ton Chevrolet rear dump trucks, was working on the top bench, taking a cut of top soil and sand from 12 to 15 feet thick. Trucks operated on a circular haul to the dump, spilling their loads "on-the-fly." Length of this circular haul ran about 1500 feet. Incidentally, the sticky sand necessitated considerable dipper-shaking and also occasional cleaning out of the truck bodies, but despite this, there was a steady flow of dirt from bank to spoil pile.

The scraper was loading on a lower bench, at present about 12 feet above the clay, and hauling up a grade to the spoil pile. The loads were dumped in two ways, the choice depending on the immediate needs in shaping and building the spoil pile. Most of the time, in order to keep out of the way of circling trucks, the scraper load was dumped all at once. The bullgrader was then brought into action and loads previously dumped (by both trucks and scraper) bladed off the side and end of the spoil pile.

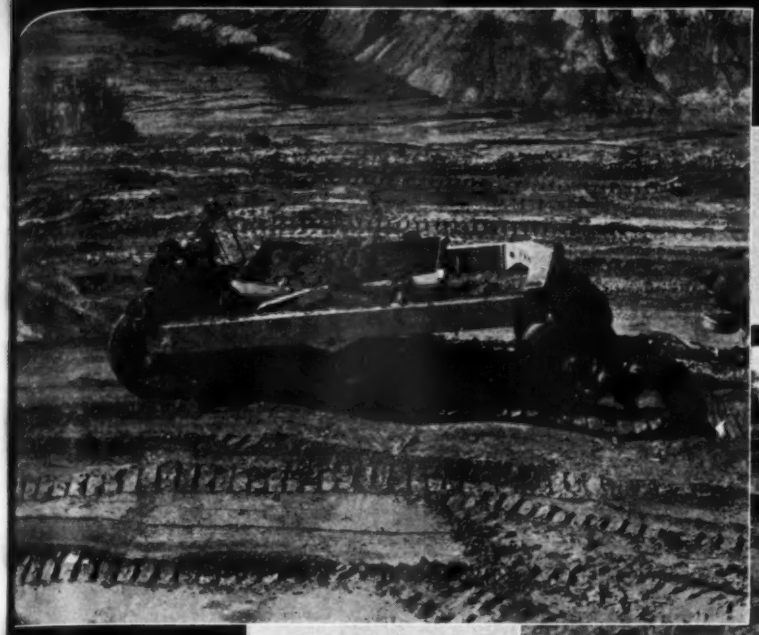
At other times, the scraper load was spread as it was dumped, the tilted apron serving as grading blade, and the bullgrader leveled off the pile at the same time. This operating flexibility enabled the tractor unit to shape the dump and maintain the dumping section of the hauling road simultaneously.

As it returned to its loading bench after the required blade work, the bullgrader was used to grade the hauling road whenever necessary. Thus, the combination of grader and scraper permits the unit to be of profitable service both "coming and going."

Saving Over $30 a Day

The road-maintenance work done by the unit has proved valuable in two ways. One of these was exemplified on the day the mine was visited. Heavy rains the previous day had made the sand, over which the hauling had to be done, extremely soft. By setting the tractor unit to the job of getting the hauling circle in shape, it was possible to start the shovel and trucks operating at 9:30 in the morning—many hours before they could have been under way without the preliminary efforts of the "handy-man."

Also, the constant road-maintenance work has resulted in a con-



Left: 4 yds. of red sand goes into the bowl. Below: And comes out again on the dump.

Right: Washing trucks at the storage and shipping plant where office and clay classifying equipment are located.

Above: A bladeful "rolls" over the end of the dump. Left: General Manager Richard Bell.

● After a heavy rain, the tractor unit works on the hauling road so the shovel and trucks can get going. And it combines this job with stripping "pay dirt."

siderable reduction in wear and tear and maintenance costs on the trucks. Although it is difficult even to estimate the savings made possible in the above two ways, the combination of loading-and-carrying, and dump and road maintenance has permitted other savings which General Manager Richard Bell has estimated at about $30 a day.

Appearance Is Valuable

The efficient team-work between shovel, trucks and tractor unit is one of the outstanding features of this job, but it is not the only one. Any visitor at the mine cannot but be impressed by the appearance of the equipment. Washed at frequent intervals, the fleet of trucks has cabs painted either in red or blue. The three shovels are not only kept clean, inside and out, but are repainted whenever necessary to keep them looking, as well as being, constantly in A-1 shape.

A matter of policy in keeping with all the other efforts made to guarantee cleanliness in the clay itself, the appearance of the equipment has a dollars-and-cents value in addition to the excellent "advertising" it provides for customers, and the efficiency of mechanical maintenance it makes possible. Working with equipment which not only performs well, but looks well also, is a constant incentive to the crew to do the best job of which they are capable.

Personnel

Combined with an ability to select the right men for the job, the above outlined policy has built up an unusually competent crew. Mr. Bell is proud of them, and they obviously back him up by turning out a smooth running, efficient open pit mining operation.

This Gleason mine has storage equipment and classifying plant, about two miles from the pit, with an annual capacity of 40,000 tons. The high grade clay shipped from here to the leading ceramic manufacturing centers of the country, together with ball clay shipped from other mines in the western Tennessee and western Kentucky region, has largely replaced the clay which was imported from abroad before the war.

Founder of the Bell Clay Company was Fred S. Bell. Richard Bell is General Manager. Operators on the tractor unit are F. G. Trantham and W. C. Hathcock.

Foot Pounds per minute

An explanation of the easily computed foot-pounds per minute method of estimating blast-hole drill efficiency

By A. R. TOFTE

PICTURE, if you will, the average quarry or open pit mine. Down in the pit, the superintendent watches the shovels with an eye that sees every cubic yard—knowing almost to a pebble how much ore or rock is being moved each day and catching the slightest inefficient act. There is no question of it—down in the pit the average superintendent knows what he wants and how to get it, and he runs everything under the best and most modern methods available to him.

But back on the bank, often working months ahead of the shovels, is a fleet of blast-hole drills. They have been up there for years, running along with plenty of noise and show of activity. No one pays any particular attention to them. What if one or two of them do break down for a few days? The drillers will just have to sweat a bit more and maybe work overtime for a week or two or work on Sundays or even start an extra shift to catch up on the lost time.

Once in a while the superintendent casts a weather eye toward the cliffs to see if the drills are still operating. Perhaps once in a blue moon he actually climbs up and sees for himself just how they are getting along.

If the pit is typical—perhaps all too typical—the drills are probably anywhere from 10 to 30 years old. They may even work as well as they ever did. As the superintendent stands there, looking at them, he hears the steady pounding, he sees the slash of the cable, he watches the bailer come up and be emptied. "Just as good as they ever were," he says to himself. Of course, now and then they break down. But no one minds particularly. The holes are being sunk . . . the schedule is kept up more or less . . . and no one is complaining.

What's the Real Cost?

And yet—if the superintendent realized the truth, he would be the first to complain, the first to do something about remedying the situation!

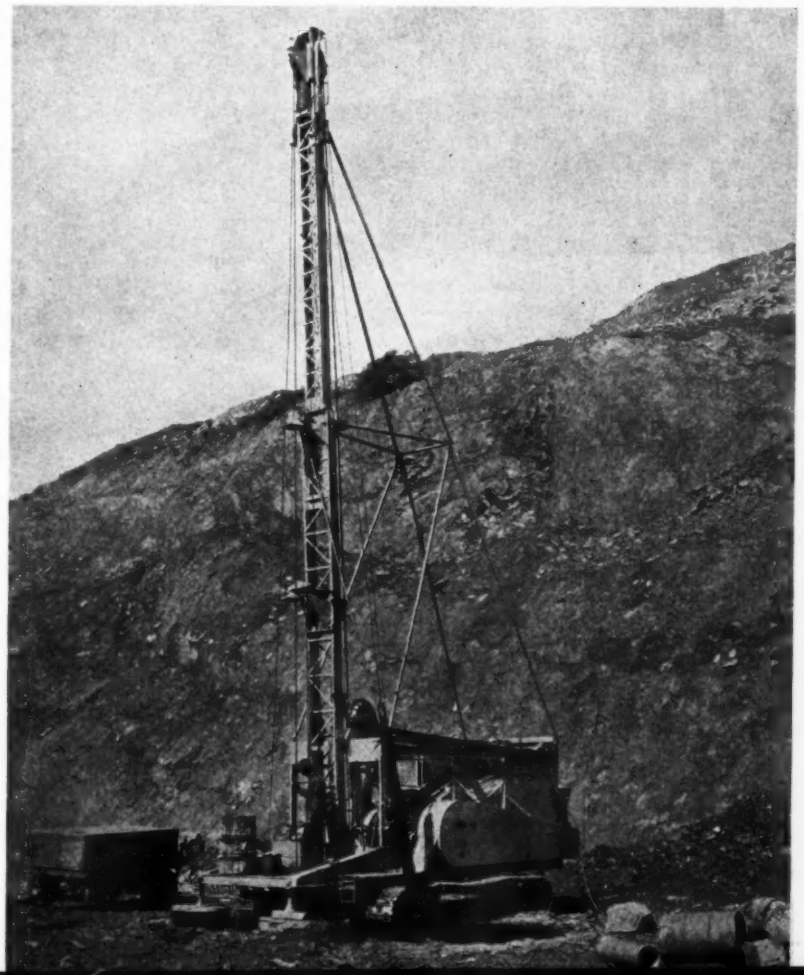
Changes have taken place in blast-hole drilling that make old-fashioned ways expensive and unnecessary. Today, the mining and quarry official should give full attention to bringing his blast-hole drilling up-to-date both in equipment and in methods.

But, of course, the first thing to do is determine how efficient your present equipment really is. There is no use even starting an argument until you know that. It is suggested, therefore, that you use the following performance-gauge which any superintendent can work out for himself to determine the actual efficiency rating of his blast-hole drilling equipment.

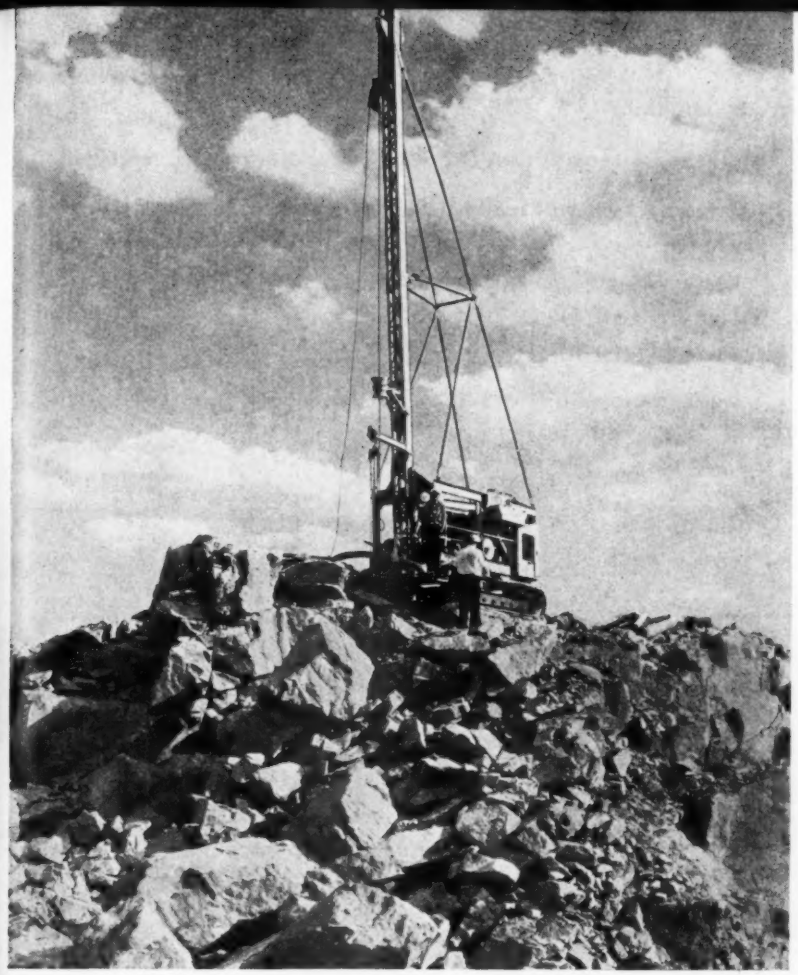
Using this simple, easily-figured yardstick of measurement, the superintendent can go into his drilling problem and in less than half a day find out just how efficient his drills are. This measuring system is called the foot-pounds-per minute method.

There is no magic about its application for gauging drill efficiency—and there is no question about its correctness. All it takes is a pad of paper, a pencil, a measuring rule, and a watch. And here is how to do it—

Drillers agree that the penetrating force of the drill bit at the bottom of the hole depends on



● In the Pennsylvania coal fields this rig is putting down 12-inch holes. Normal rating for the drill is 1,142,400 foot-pounds-per-minute.



● Above: A 9-inch drill in use in a Wisconsin rock quarry. Normal operating rating for this machine in average conditions is 539,205 foot-pounds-per-minute. On the opposite page is a 6-inch rig at work on the iron range. It's normal operating rating is 329,940 foot-pounds-per-minute.

several factors—the weight of the tools, the number of strokes per minute, and the distance of travel of the tools in their fall. There are other factors involved, too, such as the shape of the bit, its degree of sharpness, and the quickness with which the blow is struck and pulled away before a damping effect is given to the blow. These last factors, however, are variable and for purposes of this discussion may be ignored for the moment.

First, find out exactly the weight of tools being swung by the drill you are testing. Be sure to get an accurate weighed measurement and not what the driller "guesses" he is using.

Second, get out a measuring rule, and actually measure the drop of the tools by putting marks on the cable at the top of the hole and operating the machine at normal speed.

Third, take out your watch and count the number of strokes per minute when the drill is operating at *normal* speed. Don't let the driller speed up above his normal speed for the test or you will get a distorted estimate.

Going back over the figures you now have, let us suppose you found that the drill is swinging 1150 pounds of tools with a travel of 29 inches at a speed of 54 strokes per minute. By making an equation of this, you get—

$$\frac{1150 \times 29 \times 54}{12} = 150{,}075 \text{ foot-pounds per minute.}$$

This means that your drill is giving 150,075 foot-pounds per minute theoretical energy at the bottom of the hole. But is this enough?

What Should You Get?

In the last few years a number of very interesting developments have taken place in the manufacture of blast-hole drills. None of these improvements is startling by itself, but together they make up a number of very excellent reasons why some of the new drills now on the market have efficiency ratings as much as 100 and 200% over old-time rigs which present owners think "just as good as ever." Actually costing less to operate, these new drills are able to swing a heavier string of tools with a longer tool travel. The speed of the stroke is still about the same, due to the unchangeable speed of gravity, but very interesting devices have been worked out to increase the speed of the upstroke.

Today, a typical modern drill—one you might buy to replace the rig you have just measured as giving 150,075 foot-pounds per minute—should be able to swing 1800 to 2000 pounds of tools. Its tool travel should be at least 40 inches; its speed 54 strokes per minute. A drill of this type, therefore, has an equation something like this, supposing we give it 1850 pounds of tools—

$$\frac{1850 \times 40 \times 54}{12} = 333{,}000 \text{ foot-pounds per minute.}$$

In other words, the modern machine has an efficiency rating, in this case, more than twice that of the old drill. In addition, there is tremendously less chance for breakdown or waste time, a material saving in moving time, considerable saving in tool-change time on certain of the modern drills, plus a decided increase in safety. The superintendent who actually figures out his present drilling equipment's efficiency in this way and discovers that his rigs are only about 50% efficient will soon realize that *one* of the new machines will not only take the place of two of his old rigs—but will give additional savings in labor and operating costs.

In conclusion, here is another suggestion. After you have tested the efficiency of your own drilling equipment by the simple theoretical foot-pounds per minute method, if you do decide to get new equipment, be sure to use the same method for testing the new drills you buy.

Top: As the Exposition will look from Oakland.

Center: As the site looked recently from the 3,000,000-gallon water reservoir.

Bottom: As it will look in 1939 from the same spot.

Exhibit Palaces

Guy F. Atkinson Company uses two Bucyrus-Erie 50-B cranes in erecting framework for Golden Gate Exposition Buildings

By HOWARD KING

TEN MILLION dollars in construction, including a large reclamation project, is either completed or under way for the 1939 Golden Gate International Exposition, to be held on what is described as the "world's largest man-made island."

From February 18 to December 2, 1939, this $50,000,000 Western World's Fair will sparkle on its 400-acre Treasure Island in San Francisco's harbor. Created to celebrate the industrial progress and vacationland marvels of the Pacific basin, the Exposition will be a "travel Fair" in spirit and tempo.

For this design, the site is ideally located. The island is reached by the $77,000,000 San Francisco-Oakland Bay Bridge and interconnecting highways across Yerba Buena Island; three ferry slips will handle other millions of visitors from both sides of the Bay. Within sight of the island is the $33,000,000 Golden Gate Bridge; the wake of tramp steamers and luxury liners wash the shores of Treasure Island, and overhead pass the Clipper Ships on their weekly scheduled flights to the Orient.

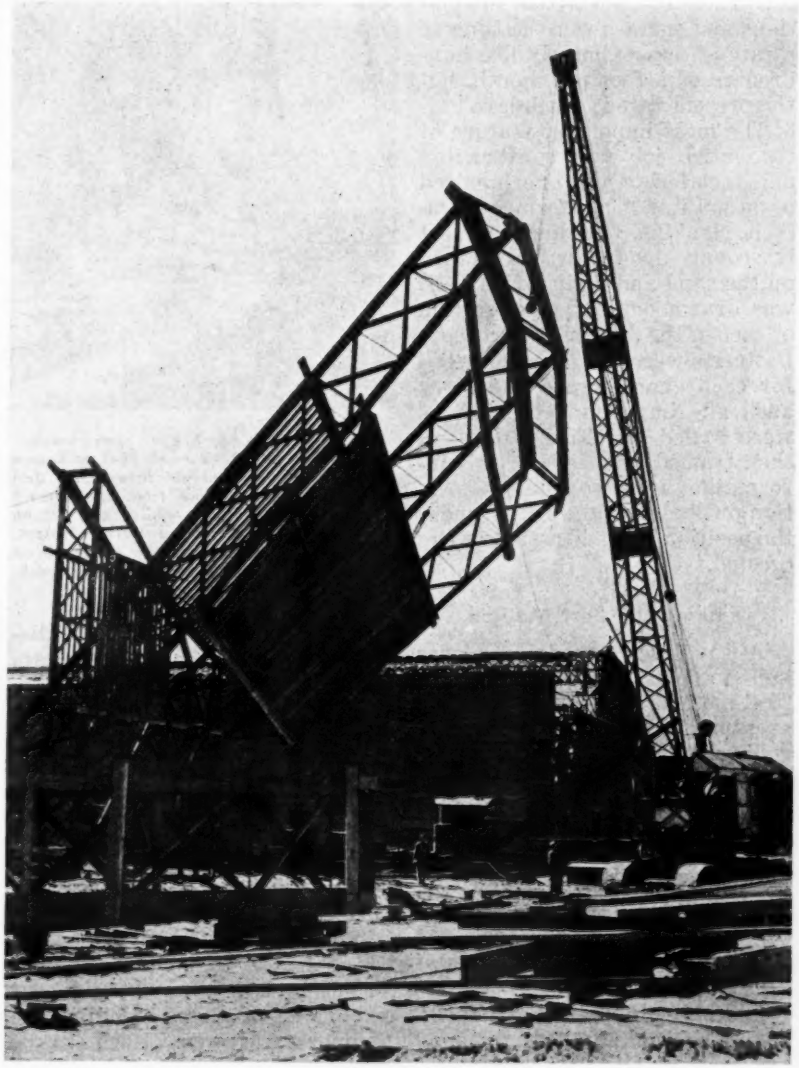
Largest on Record

Construction of the six exhibit palaces for the exposition was one of the largest projects of its type in engineering history. These buildings cover a ground area of 800,000 square feet; each of the two largest being 886 feet long by 200 wide. They will house a variety of exhibits including mines, electricity and communication, vacationland, health, science and education, food and agriculture, homes and gardens. Contract for erecting these buildings was handled by Guy F. Atkinson Company.

Construction of rod and block type was used throughout the frameworks, which rest on piling foundations driven approximately 70 feet into the sand and clay dredged up from the bottom of San Francisco Bay. A total of 1,493 untreated wood piles were used. Twelve by twelve sills resting on the piles support the side walls; while the arches, having various spans of from 117 feet to 198 feet and heights from 54 to 73 feet, rest on concrete footings approximately six feet square by three feet deep formed over three pile clusters.

Uniform Settling

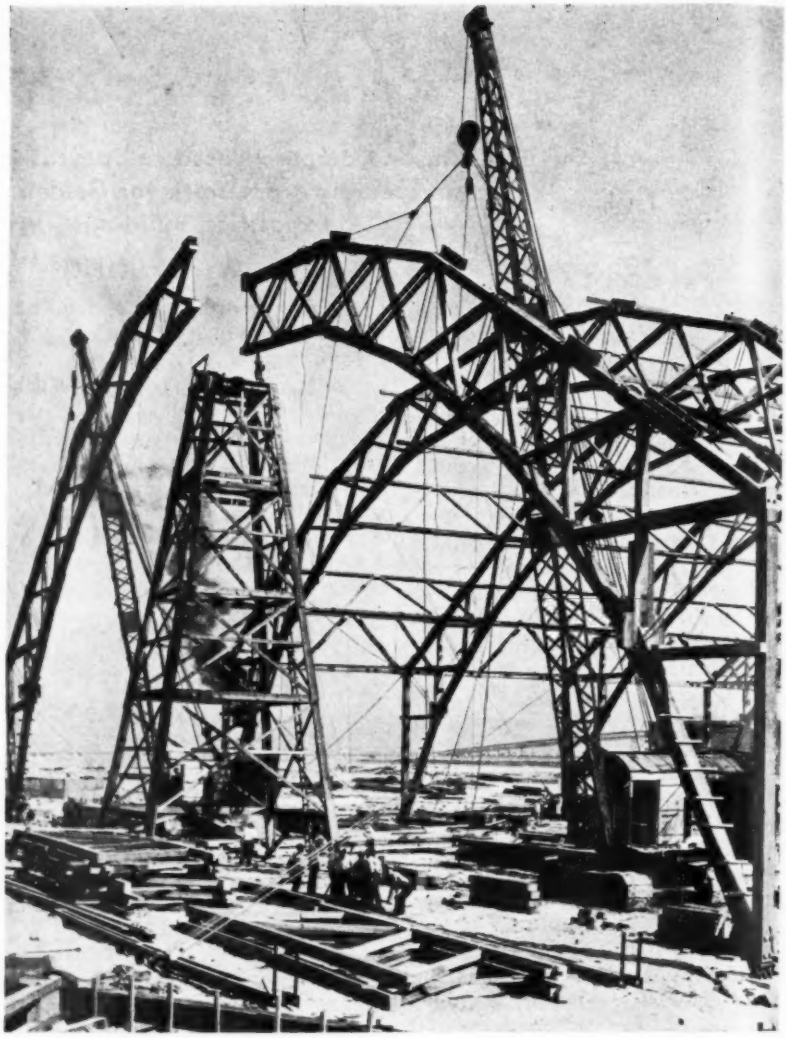
Free-floating floors of $1\frac{5}{16}$-inch hemlock about five feet above



● Erecting one of the three sections making up an end wall. One section is already up, the center one is in mid-air, and the third lies, framed, in the foreground.

grade level are used throughout. Typical construction consists of three-inch mats, two feet square, bedded firmly just beneath the surface of the sand and spaced every 12 feet. These mats carry six by eight posts approximately three feet long upon which rest six by twelve girders, two by twelve joists and finally the flooring. This construction will permit the floor to be releveled in case of excessive settlement, by pulling the double headed nails which fasten the posts to the mats and shimming up under the posts. One quarter inch clearance is left between the flooring and side walls at the points. As would be expected, the newly formed island is gradually settling but this process has been sufficiently uniform so that to date no abnormal effects have resulted. At the time construction was started, foundations and surface were settling at a rate of approximately five hundredths of a foot per month, but the present rate is much less.

The most important feature of the entire job was construction and erection of the one hundred arches. First a platform of two-inch planking two hundred feet by seventy-five feet was laid down on the sand and on it to full scale was drawn out a typical section of each of the five different arches. Patterns were made of plywood for each chord, brace and block and all important dimensions were scaled off. Each arch was then framed by means of this information in a convenient location on the ground directly under the position it would assume when erected.



● Erecting heavy arch trusses. The two 50-Bs with 85-foot booms swing the arches into place, and joining is done from the central tower. Then, while one crane erects connecting purlin trusses, the other moves the tower ahead in readiness for the next arch.

Finding the Best Method

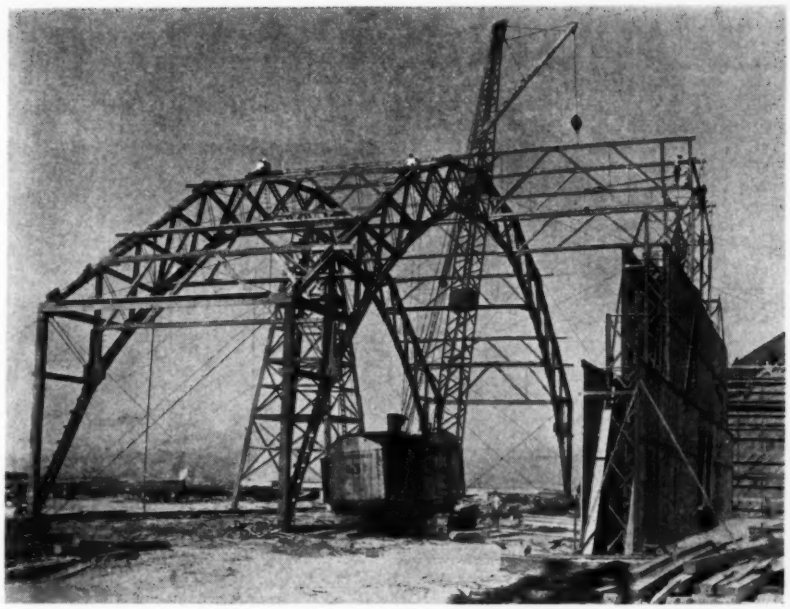
A small scale model also was built to determine the most practical method of rigging. This was eventually found to be a six point rolling hitch that enabled one crane to pick up a half section of the arch which would swing into a vertical position of its own accord from the horizontal position in which it had been framed on the ground. Considerable apprehension was at first felt that such a heavy truss (19,800 pounds) designed for vertical stresses would be unduly strained if picked up horizontally, but the final method adopted not only distributed the unnatural stresses safely but also resulted in the remarkable erection speed of four complete arches in eight hours by two cranes fitted with eighty-five foot booms.

A four sided tower was built as a temporary support for the arch sections while the center pin was being placed and purlins were being connected back to the previously erected arch. When everything had been made fast, both cranes moved forward to the next arch, one of them bringing the temporary tower. Each crane then picked up its arch section, the center pin was placed, purlins were inserted and the entire routine repeated on the succeeding arch.

The timbers used in the arch cords were of douglas fir twelve by twelve, twelve by fourteen, and fourteen by fourteen in lengths up to as much as 76 feet. The only metal parts employed were the hinge plates at top and bottom, one pair of $\frac{3}{8}$ gusset plates at junction of vertical member and upper chord, numerous $1\frac{1}{4}$-inch bolts, and nine pairs of truss rods to each half section.

Novel Boom Extension

Sidewalls were of $\frac{3}{4}$-inch byrkit sheathing over studding and are to be stuccoed later. Whenever possible, these walls were framed on the ground and erected



● One of the 50-Bs, rigged with a 70-foot jib boom supplementing its regular 85-foot one, swings a purlin truss into place.

in panels. Setback walls on the roof were handled likewise, and in cases where the single 85-foot boom gave insufficient reach, more was obtained by lashing a 70-foot piling to the upper section of the boom as shown in one of the accompanying pictures. This augmented boom made it possible to frame rafters on the ground and lift them into exact location in sections far up on the roof slope.

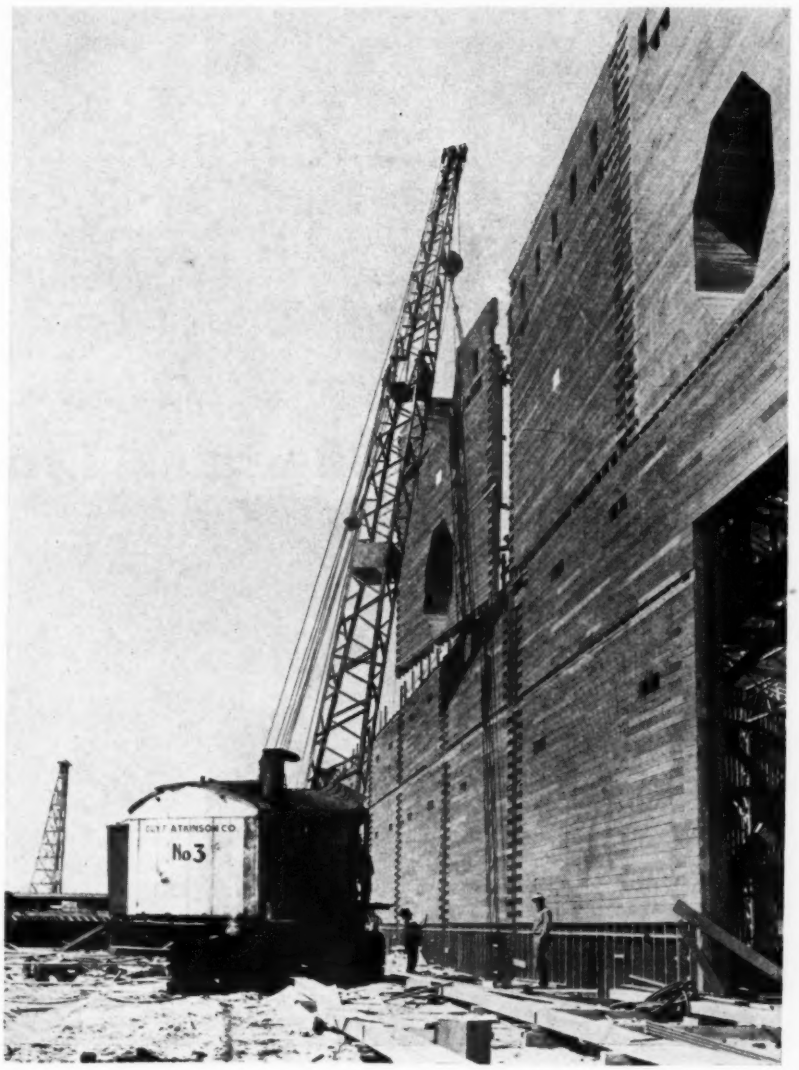
Prior to actual building construction, to reduce the expense of rehandling several million feet of lumber, a freight slip was built on the shore of the island and a standard gauge track system was laid adjacent to the building sites. Entire train loads of material were ferried in on barges and distributed about the job by a small switch engine. Unloading was done by cranes and here the 50-B's with their jib-extension booms were especially helpful because of the large area they could cover and because they could lift the lumber directly from car to roof, thus eliminating much rehandling.

10,000,000 Board Feet of Lumber Used

Pile driving was started about the middle of March and final approval of the job was obtained on November 16. In this interval ten million board feet of lumber were placed by Guy F. Atkinson Company of San Francisco under the contract just described.

An additional contract has just been completed by this firm for arches and general finishing work on the palace exteriors. The most important part of this contract was the framing and erection of an arch 104 feet high by 60 feet wide. This complex structure was framed in sections on the ground and erected by means of the two cranes. Each of the two towers

(Continued on page 298)



● Side walls were framed on the ground and erected in sections as shown here. Worked out carefully with scale models, the method of erection proved smooth and successful.

EXCAVATING ENGINEER

A Monthly Publication Devoted to the Excavating Industry

The Excavating Engineer Publishing Co.
South Milwaukee, Wisconsin

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Will It Pay to Drill?

Despite its obvious importance, adequate pre-bidding information is all too often ignored. Then, when unexpected trouble turns up on the job, the contractor is in hot water. This point is well illustrated by the following material, quoted from a bulletin of the Standard Drilling Company of New York.

"There's an old saying that you pay for what you need, whether you get it or not.

"Of nothing was this ever more true than of exploration drilling. To take a famous example we needn't be afraid to mention now, because it happened almost thirty years ago, there were the foundations for New York City's Municipal Building. A gully, whose bottom lies far below reach of the pneumatic process, runs across this plot. Its existence was known to geologists even then. Yet only four diamond drill holes were sunk prior to letting a million-dollar contract. But one of these fell in the gully, and it hit a boulder some ninety feet below water level, which was taken for bed rock. The delay and cost, both to the City and to the caisson contractor, when the true condition developed, would of course have paid many hundred times over for thorough exploration work.

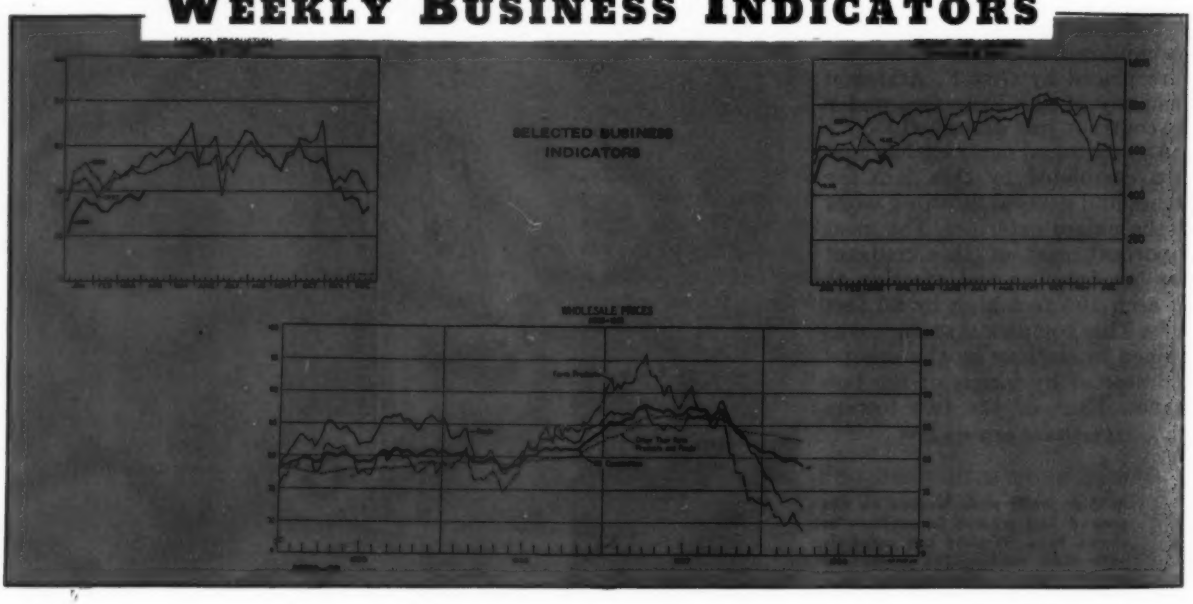
"This example may be ancient history. But the practice of starting construction without adequate —or any—exploration work is still nearly as common as it was in 1909. A department of this same city, as recently as last year, found it necessary to suspend work on an important tunnel for further exploration work, and eventually had to go two hundred and twenty feet deeper than had been planned.

"Some people think their bridge, or mill, or tanks too small an affair to need any preliminary drilling. They know the rock is fifteen or twenty feet down there, and ordinary earth is over the top of it. Why spend money for holes? They just let a contract, and let the contractor take the chances. Which, they think, can't be great in any case.

"Right here such people pay for their drilling work, and also fail to make it pay. Some contractor takes the risk, willingly. Because he gets paid for taking it! In even simple cases, the extra amount the contractor must bid to cover uncertainties will much more than pay for removing those uncertainties in the first place. This extra amount must go in the bids, even where it has to be disguised in unit prices. If it did not, the contractor would not stay in business long enough even to make a reputation. And the great majority of our work today is done by reputable contractors, who continue in business and make a living at it, year after year.

"The theory that the low bidder is foredoomed to lose, and there will always be a fresh crop of suckers to take his place when he has to give up contracting, no longer holds water. If a contractor does not know how much levelling off will be needed, how much rotten rock he will be asked to remove, or whether the "ordinary earth" through which he must go will keep out water, or stand up, or develop a streak of quicksand, his prices reflect that lack of information. Such ignorance is a cash hazard he has learned to include in his calculations. He allows for the possibility that rock is badly seamed, and may require extra pumping. Or that the surface may slope steeply, requiring unlooked-for drilling and blasting. Such contingencies, too, may affect you more directly. The whole job may be delayed, piling up indirect costs for the owner, as well as for the contractor, much larger

WEEKLY BUSINESS INDICATORS



than the mere amount of unforseen work involved.

"Every uncertainty removed before bids are asked, results in lower contract prices offered—every time. Foundation uncertainties are the most important ones in many cases. Removing them is about the cheapest thing an owner can do. Cheap, not only in the sense that it pays handsomely, but actually cheap, in dollars and cents.

"Take a simple case—a small bridge with only its two abutments below ground, where appearances indicate rock will be found ten feet below the stream. Eight holes, one near each corner of each abutment, carried five feet into rock, will give the exact yardage involved. They will show just what condition the rock is in. They will indicate if it is seamed, and will require extra pumping. They will show whether boulders or gravel or any liquid material, all of which will affect the cost, will be met. And, at current contract prices, they would cost, in ordinary locations, hardly three hundred and fifty dollars!

"What contractor, without this information, would be able to figure the cost of two such cofferdams that close?

"And what contractor would not figure the exact cost, if he were given the exact conditions on which to figure?

"Or, take the experience of a big oil company with a small job last year in a New England port. Two tanks at the site had settled badly, and more property, further back from the water, was bought to locate two new tanks. Of course, with the idea that foundation conditions would be better. But the oil company took title first, and drilled afterwards. The drilling, which cost only two hundred and fifty dollars, indicated that conservative practice called for the use of piles. The oil company felt the expense would not be justified, and took a chance. The new tanks settled. When the oil company abandoned the site and bought a new one, they took it on option and had the drilling done first.

"No one thinks of buying a piece of property without having the title searched. Why buy a piece of property on which to put up heavy structures without having the foundation searched—often at less cost than for searching the title?

"This oil company doesn't—today. It plays safe. Just as the contractor plays safe when you can't tell him exactly what he will have to do.

"Why not, Mr. Engineer, play safe yourself?

"Have the necessary drilling done."

W. H Botten

William H. Botten, president of the Owen Bucket Company, died at his home in Shaker Heights, Ohio, on March 27, after an illness of a month. He was 73 years old.

Following years of experience in the sand and gravel business, Mr. Botten acquired control of the Owen Bucket Company in 1908. His passing will sadden his associates and the host of friends he made during his many years of service to the excavating industry.

In addition to being one of Cleveland's leading business men, Mr. Botten was widely known for his club activities. A member of the Cleveland Chamber of Commerce, the Rotary Club, and the Cleveland Athletic Club, he was also a golf enthusiast and active in Masonic groups.

His three sons, Henry W., John B., and Edward W. Botten, are all associated with the Owen Bucket Company. In addition to them, he is survived by three brothers and two sisters.

E. S. Heyser

Estill Samuel Heyser, prominent contractor of Dallas, Texas, died recently after a prolonged illness. His loss will be keenly felt by his many friends and associates in the excavating and contracting industries.

From 1924 to 1928, Mr. Heyser was vice president of W. E. Callahan Construction Company, for whom he was in charge of construction and engineering work on Lake Dallas, Lake Kemp at Witchita Falls, a Miami Conservency District project at Columbus, Ohio, and an inter-river drainage district project at Poplar Bluff, Missouri.

From 1930 until his death, Mr. Heyser was a member of the firm of Heyser and Heard. In addition to his contracting, he was interested in producing and contract drilling in the oil field.

He is survived by his widow, his mother, one son, and a brother.

Construction Up In March

Construction contracts in the 37 Eastern States rose 91 per cent during March as compared with the preceding month. This gain was far greater than the usual seasonal increase from February to March and was sufficient to produce a contract volume but little less than the March, 1937 total. As reported by F. W. Dodge Corporation, the March 1938 total of contracts awarded amounted to $226,918,000 for all classes of construction. This amount compares with $118,945,000 for February and $231,246,000 for March of last year.

The gains reflected in the March construction volume were distributed among all the major classes of building. Residential building, amounting to $79,396,000, showed a 98 per cent gain over the preceding month, which is encouraging. Contracts in this class of work in January were 54 per cent behind January, 1937; February contracts were 36 per cent behind February, 1937; while March contracts were only 12 per cent behind March of last year. Increased F.H.A. mortgage applications and numerous planned large-scale housing projects have not yet been reflected in the contract record, and these factors give promise of continued rises in contract volume in later months.

Non-residential building, amounting to $87,823,000, was 81 per cent above the February total and public works and utilities with a total of $59,699,000 was 96 per cent above the total for the preceding month.

Both public and private construction during March increased beyond the usual seasonal proportions. Public construction amounted to $94,597,000 for March as compared with $51,054,000 for February, while private construction totaled $132,321,000 as compared with a February total of $67,891,000.

PAVING

Atlantic Bitulithic Company specializes in 2-layer surfacing for modern streets and highways

By SPENCER A. JONES

DOWN in Richmond, Virginia, the Shrine of the Lost Cause, the capitol of a dead nation and of a living state, they are justly proud of their tree-shaded streets. Now grown tremendously since the surrender at Appomattox, the city has spread in broad avenues across the fields and along the country roads where once the men in gray marched and countermarched; avenues that are greener, more tree-shaded and far better paved than ever the old streets were.

Many miles of this paving has been entrusted by the Richmond City Fathers to the Atlantic Bitulithic Company of Richmond, whose general offices are in the Munsey Building, Washington, D. C. At the present time the Atlantic Bitulithic Company is completing about $150,000 worth of paving work for the city. Under the supervision of C. W. Thomas, Superintendent of Atlantic's Richmond plant, some seventeen streets are being repaved either with concrete base and asphalt top or with finished concrete. The sections under construction vary in length from one to six blocks. The work includes concrete curbing, some sidewalks and pretty nearly every item of paving that can be imagined, even to several blocks of asphalt top on old pavement.

Four Plants Handle Mix

The Richmond plant of the Atlantic Bitulithic Company, at the corner of Roseneath Road and Clay Street in an outlying section of the city, was constructed in 1906. It is one of four mixing plants owned and operated by the company, whose territory includes the South Atlantic States from Maryland south, including West Virginia. Within this area the company does street and highway work in practically all of the larger cities.

Work at the Richmond plant is essentially a mixing operation in which carefully graded asphaltic concrete is prepared and from which it is hauled to the various streets under construction. In general, Atlantic's asphalt topping consists of two layers of which the lower layer is as stable as practicable and the upper as plastic as possible. The lower mixture is well graded from coarse to fine particles, all well coated with bitumen. The upper layer, except on steep grades, consists usually of an aggregate passing an 8 or 10 mesh sieve to 200 mesh, with as much bitumen as can be added yet still be workable on the street.

The lower layer is spread about 2" deep (loose measurement), then while this is still hot and malleable, a thin layer (the upper layer) of rich, fine aggregate bituminous mixture is spread over it and immediately the whole mass is compacted by rolling. The result is one integral layer which is exceedingly stable in its lower portion, yet plastic at its upper surface—with an extremely gradual change from the relative rigidity of the lower portion to the plasticity of the top surface.

Mobile Equipment Needed

The handling of stone and sand from cars to stock piles and from stock piles to the elevator boots in the mixing plant, where the bituminous concrete is made requires equipment of very definite characteristics. Such equipment must be mobile, moderately priced, economical to operate, have a considerable working radius and yet be compact in size.

Usually there are at least four stock piles of aggregate to be kept replenished from the cars and fed to the hoppers over the elevator boots. For instance, at the time the plant was visited for the purpose of collecting material for this article, the stock piles consisted of 1" stone, ⅜" stone, sand and rock dust.

A 19-B Bucyrus-Erie crane with a 40-foot boom and a ½-yard clamshell bucket was feeding the hungry hoppers with 300 tons of 1" stone daily, the stone weighing 2,700 lbs. to the cubic yard. And to balance the plant's diet properly, the 19-B was also providing 15 tons of ⅜" stone, 50 tons of sand and 4 tons of rock dust daily.

J. W. Gentry, who for some unknown reason seems particularly proud of the fact that he comes from Hickory, North Carolina, was seated proudly in the cab and

● The 19-B is shown here loading rock to the mixing plant hopper at the company's Richmond, Virginia plant.

Above is a "before and after" view of Operator Gentry at the levers of the previously-used 24-B steamer and the present 19-B gas rig. Below is the Atlantic Bitulithic Company's $\frac{3}{8}$-yard drag shovel putting in storm sewer to help guarantee happy landings at Langley Field.

● Top: Atlantic Bitulithic personnel at Richmond includes, left to right: C. B. Pope; J. W. Gentry; P. R. Leitsch; and superintendent C. W. Thomas. Below: The 19-B handling sand with 40-foot boom and ½-yard clamshell bucket.

was perfectly willing to pose for his picture if the photographer would promise to mention prominently the important matter of Hickory, North Carolina. Mr. Gentry is a very good housekeeper, if you can call the cab of a 19-B a house. Everything on the machine is as neat as a pin. When the photographer commented on this, Mr. Gentry remarked that he was the only man who had ever operated the machine; that he had, in fact, unloaded it new from the freight car and that, by cracky, he was going to keep her looking like new.

Replacing a Steamer

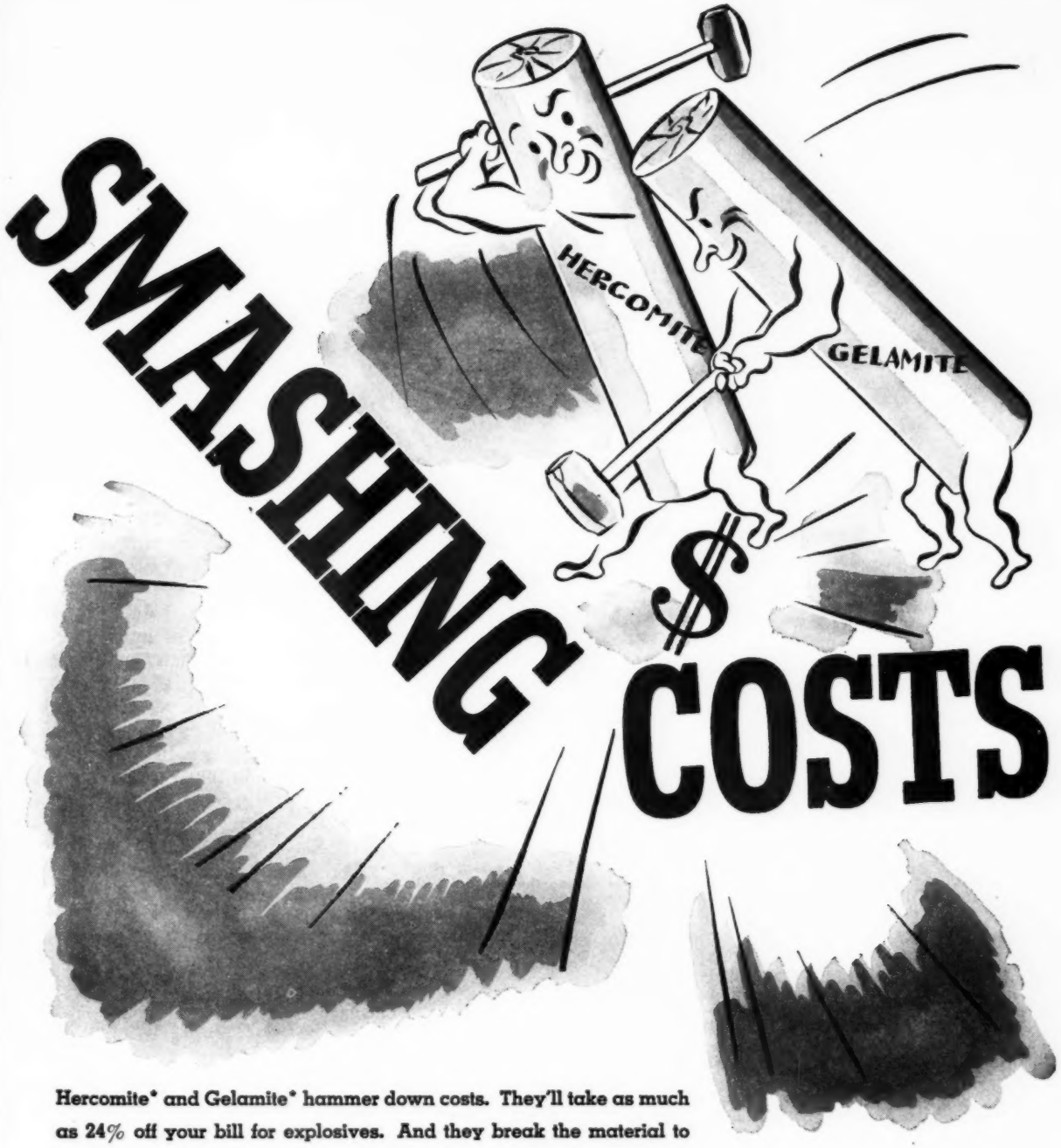
The 19-B works an eight-hour day, using 18 gallons of gasoline per day and only one pint of oil per week! The present 19-B was preceded by an old Erie steamer, a 24-B, fifteen years old, on which Mr. Gentry worked at all sorts of jobs for many years. The old steamer which had a ¾-yard clamshell bucket for loading loose material and a ¾-yard dipper for excavation work, has been traded in for some new road equipment, as it is still in excellent condition. The new owner plans to recondition it and sell it, but at the time the job was visited, it had not yet been hauled away and Mr. Gentry consented to pose in the operator's seat where the absence of crane boom or dipper boom made the old steamer look a bit odd.

Between the time the old 24-B Erie steamer was officially traded in and the 19-B officially purchased, another make of equipment was tried out, but it was the wrong size for the job that had to be done. It used more than 50 gallons of gasoline per day and 8 quarts of oil per day, which made the 18 gallons of gasoline per day and the single pint of oil per week later consumed by the 19-B look rather economical, to say the least.

From Crane to Shovel in Under Two Hours

C. W. Thomas, plant superintendent, estimates that it would require from 40 to 45 men to do the work of the 19-B at the mixing plant. In addition, he remarks that the 40-foot crane boom can be removed and the dipper boom, dipper stick and dipper hooked up complete in less than two hours. This, he states, is a very great advantage as there are frequent occasions when a shovel is needed for certain highway work. In such cases he simply loads the 19-B on his trailer and tows it to the job. The changeover from crane to dipper boom requires the services of Mr. Gentry, Larry Woodward, his helper, and one other man.

On the way back north from Richmond, the photographer stopped in Washington and called on A. L. McDannald, Treasurer of the Atlantic Bitulithic Company. In the course of the conversation Mr. McDannald mentioned that his company has also been using a new ⅜-yard 10-B Bucyrus-Erie shovel on a project for the U. S. Army Airport, Langley Field, Virginia. This was a Soil Stabilization Project involving the handling of 233,000 sq. yds. of 5″ base course with a 1″ thick Surface Treated wearing surface. It also included a complete drainage system with box drains, concrete pipes and box culverts of assorted sizes. The intent being to construct four airplane runways each 150 feet wide and the longest about 4,500 feet in length. In general the soil was scarified, mixed intimately with an Emulsion Stabilizer, leveled off and rolled.



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3/8-Yard Baby

In a 5 and 10 Cent Store

By R. H. DEIHL

FROM boiler room to basement in a week's time is the excavation record Thomas M. Madden, Chicago contractor recently hung up on his job for Morris Handler, general contractor for the enlarging of the Woolworth Store at Belmont and Central Avenues, Chicago. There was nothing but a small boiler room below the Woolworth "Five and Dime" when Mr. Madden moved his 3/8 yard baby, a Bucyrus-Erie 10-B shovel, in to do the work. In order to get the machine into the room a ramp was dug by a Lorain 60 which had been doing the general excavating outside the building. The 10-B was then run down the ramp into the boiler room and the job was under way.

The room was originally 48 feet wide with a row of posts set 32 feet from one side. The little shovel was first moved over to the 32 foot wide space where it loaded out considerable debris and earth, mostly clay, to 4-wheel, 6-yard Mack trucks. When the enlarging was completed on this side, the row of posts was set over to the center line, the shovel run over on the other side into the 24-foot space, and the excavation finished.

During the job the 10-B was required to do a lot of fancy tricks in removing concrete partitions and maneuvering in and about the supporting columns. The foundations of the building had to be undermined and all this work was handled by the shovel in a rather unusual way. A 3000 pound ball was hung on the boom at a 15-foot radius and swung against the 13-inch concrete partitions until they were completely demolished. The wreckage was loaded out and then the undermining excavation was begun. When this was taken care of, the underpinning was set in. The confined quarters and heaviness of the concrete partitions can readily be seen from the accompaning illustration.

The engineer on the job for Mr. Madden was as enthusiastic about the "3/8 yard baby" as were any of the rest of the men. He said that the little fellow could come out of any hole that a tractor could and come out under its own power too, just as long as there were bolts or cleats on the cats to afford traction. 1500 yards of material were handled without a hitch, and although great care had to be taken in undermining the foundations, removing the supporting posts, and putting in new columns, no setbacks were encountered, which is much to the credit of the ability of Mr. Madden and his crew.

● Loading 1500 yards of dirt to trucks was only part of the work done by this 3/8-yard shovel in enlarging a Woolworth store in Chicago. Undermining foundations and removing concrete partitions were among the unusual tasks the rig handled.

STEPS UP *Tractor* SPEED *and* YARDAGE

● Independently powered . . . operated by hydraulic control . . . the A-W 12-Yard Scraper eliminates slow-downs and assures instant, accurate adjustment of massive parts. There is no lag in tractor speed when making front gate or pan adjustments . . . no weakening of the drawbar pull . . . no slowing up of digging speed . . . no reduction of capacity.

With an A-W 12-Yard Scraper on the job, the full output of power from a tractor is confined to the single task of steady pulling . . . faster digging. Because the Scraper generates its own power, front gate "bites" through material piled ahead . . . heavy loads are retained, loading and dumping are fast and complete.

Finger-tip operation of hydraulic controls gives accurate adjustments or wide range movements of pan or gates, to secure the highest output. Smooth, swift power is unleashed instantly to speed up every operation. Action is never sluggish, incomplete or inaccurate. Operator's time and strength are conserved. Superior three-point suspension gives unusual flexibility. Special alloy steels give unusual combination of abuse-defying strength and power-saving lightness. Mail coupon for full details on time-saving, yardage-boosting advantages.

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Convincing evidence that Skrainka Construction Company has found the A-W 12-Yd. Scraper an outstanding performer is their purchase of two units in 1937. When unit No. 1 was put through its paces in the spring of that year, President W. J. Skrainka wrote us as follows:

"We wish to advise you that we are extremely well pleased with this machine. It has exceeded our expectations in every respect."

In November, 1937, Mr. R. N. Skrainka, Vice President wrote again:

"The Scrapers which we bought from you for use on our Mississippi Highway projects are performing very satisfactorily, requiring a minimum of maintenance and fuel consumption. We are pleased with our purchase and feel that you have conferred a favor on us by selling us these machines."

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Equipment

you ought to KNOW ABOUT

New Mack for Sand and Gravel Hauling

While bigger Mack trucks have long proved their stamina and efficiency in hauling sand, gravel, and stone in huge quantities, this new model EF Mack truck shows itself to be equally efficient for

the hauling of lesser loads, according to the manufacturer. Operated by Thomas Atherholt of Harding, Pennsylvania, this new truck hauls a payload of sand and gravel. The truck takes on the load at Falls, Pennsylvania, and distributes to points in Scranton, Pittston, and Wilkes-Barre.

Dust Controller

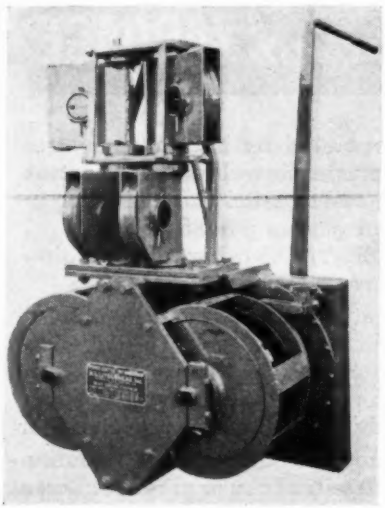
The Spencer Turbine Company, Hartford, Connecticut, has recently placed on the market a dust-control system for use with rock drills. Known as the Drill-Vac, this system consists of a vacuum producer, dust separators, vacuum hose lines, and a vacuum hood applied at the top of the drill hole. Systems available are the portable, model A, portable, model B for mounting on skids or trucks, and the stationary, model S.

New 1½ Yard Mixer

The Lee Transit Mixer Corporation, 615 Circle Tower, Indianapolis, Indiana, announces the construction of a new 1½ yard mixer, mountable on any small truck chassis. The new Lee mixer uses the central batch control plan which, according to the manufacturer, assures correct proportions of sand, gravel, cement and water, and provides a uniformly high quality product. The drum, which rotates either forward or reverse and can be stopped in any position, is driven by the truck motor through a power take-off.

New Power Control Unit

A new Double-Drum Power Control Unit has been placed on the market by R. G. Le Tourneau, Inc., Peoria, Illinois and Stockton, California. The new unit, designated as Model R8, and for use on "Caterpillar" D8 tractors has a line pull (with empty drum) of 9,600 lbs. and a cable capacity of 255 feet of ½" 6 x 19 cable on each drum.



To insure quick, positive braking, the area of the brake has been increased and an improved braking mechanism permits the application of more pressure per square inch to the drum.

Pipe Connector

The Multi-Seal Manufacturing Co., 123 N. Jefferson St., Chicago, Illinois, has produced a pipe connector which may be used to attach pipes to containers without getting on the inside. This connection may be used on steam, gas, oil, water and air containers, and will withstand high pressure.

Portable Service Station

The Alemite division of the Stewart-Warner Corporation has announced the completed development of a time-saving "portable service station," designed for power lubrication of tractors and other heavy machinery on the job. The unit is designed for mounting with a gasoline driven air compressor on a pick-up truck or trailer; alemite equipment consists of pumps, hose and control-valves for handling high pressure lubricant, gear lubricant and motor oil direct from original 400-pound barrels.

Outlets are provided for attaching an air hose to the air compressor so that tires may be kept inflated at proper pressures; so

WITH maximum application of tractor power; and a fast-acting hydraulic system for accurate blade control, the Bucyrus-Erie Bullgrader moves big pay loads in all types of digging. The curved blade delivers a shearing cut that rolls the material ahead — or sidecasts it if the blade is angled — with minimum drag of inert load. So well-balanced is the Bullgrader on the tractor—so quick-acting and responsive is the hydraulic control — that the operator easily gets the "feel" of his machine for high-speed, big-output performance on every job. Write today for illustrated bulletins on the Bucyrus-Erie Bullgrader and Bulldozer.

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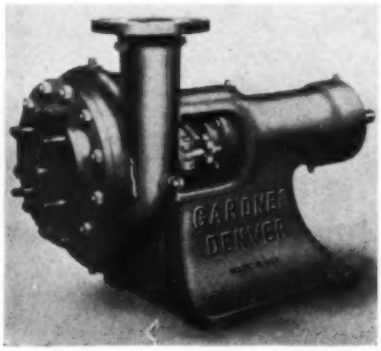
that compressed air can be used for cleaning machinery; and so that all equipment can be rapidly spray-painted on the job with the minimum loss of time.

Non-Clogging Centrifugal Pumps

The Gardner-Denver Company, Quincy, Illinois, announce their Types "J" and "K" Non-Clogging Centrifugal Pumps applicable to all industrial fields and manufacturing processes requiring the



handling of liquids in which quantities of solids are held in suspension. These pumps are built for both horizontal and vertical dry pit installations. A complete line of the necessary accessories for the vertical installations is also furnished, including shafting, guide bearings, compression and flexible couplings.

Pottsco Lightweight Concrete

Expansion of its line of products to embrace the field of weight saving concrete construction work has been announced by The Celotex Corporation. A licensing agreement with The Pottsco Corporation of Chicago for the acquisition of full rights to the manufacture, distribution, and sale of Pottsco lightweight concrete aggregate has been concluded under the terms of the contract.

The acquisition is the prelude to the introduction on a major scale of a material that is finding increasing acceptance with architects and engineers in search of an inexpensive lightweight aggregate combining structural strength, heat resistance, and non-corroding qualities. These are claimed for the Pottsco aggregate which is manufactured under a patented process for the water treatment of molten basic pig iron slag.

Pottsco aggregate is said to be suited for use in fireproofing steel, for floor systems, long span bridge decks, monolithic structures, roofs, and for lightweight building tile for use in wall structures.

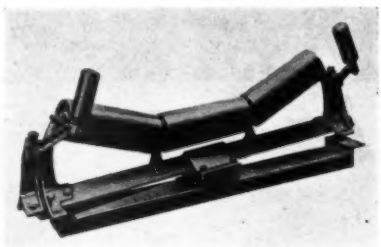
Electric Soldering Unit

An all-purpose Thermo-Grip soldering unit for all types of soft soldering work has recently been introduced by the Ideal Commutator Dresser Company, 4104 Park Avenue, Sycamore, Illinois. Operating electrically, the unit eliminates the necessity of using an open flame.

The complete soldering mechanism consists of a transformer and four heads or tools. By plugging into any A.C. supply it is ready for immediate use. All current carrying parts are fully insulated.

Self-Aligning Belt Idler

A new self-aligning idler for automatically training conveyor belts without damaging the belt is announced by The Jeffrey Manufacturing Co., Columbus, Ohio. It consists of a standard antifriction idler pivotally mounted on a supporting cross member, with guide rolls at each end. These guide rolls are mounted on pivoted arms that extend at right angles to the idler in the direction from which the belt approaches.



The arms are held in place by an easily removed locking pin. By swinging the arms through 180 degrees and putting the lock pin in place on the opposite side, the guides are made ready to train the belt when traveling in the reverse direction.

Firestone Excavator Tire

The Firestone Tire and Rubber Company has just developed and placed on the market a new type of tire especially constructed for the most destructive types of tire operations.

The tread and sidewalls of the tire are compounded of tough, cut resisting rubber. Greater thickness of the tread and sidewalls give the added protection necessary to keep most cuts and snags from extending to and injuring the cord body, it is claimed. The shoulders have been made higher to better distribute the load and are wider to protect the sidewalls.

Pipe Pulling and Pushing Jack

A number of time and labor saving advantages in the laying of pipe lines are afforded, it is claimed, through the use of a new Pipe Pulling and Pushing Jack recently placed on the market by Duff-Norton Manufacturing Company, 2709 Preble Ave., Pittsburgh, Pa.

Designed primarily for pulling and pushing without changing the position of the Jack, this new geared type Duff-Norton unit is capable of forcing pipe up to six inches in diameter.

It is for use by contractors, public utility companies, oil companies, on municipal and railroad construction projects, etc., and wherever iron or steel pipe, electric conduit or lead cable must be laid.

Welding Electrode

The Harnischfeger Corporation of Milwaukee announces Smootharc "Harmang"—another in its line of Smootharc welding electrodes. Designed for welding on parts subject to heavy impact, such as manganese castings, railroad frogs and crossings, dipper teeth, etc., "Harmang" supplies the necessary toughness and hardness according to the manufacturer. Its base metal is nickel manganese steel, ranging from 11 per cent to 14 per cent nickel manganese, 3½ to 4½ per cent nickel. Carbon content is in excess of 1 per cent.

Small Diesel Tractor

Caterpillar Tractor Company has announced a new track-type machine—the Diesel D2.

Developing 25.5 horsepower at the drawbar, the new tractor will handle appropriate blade graders, smaller maintenance machines, terracers, roll-over scrapers and similar loads.

The Diesel D2 tractor has a four-cylinder, four stroke cycle engine, with a bore and stroke of 3¾"x5". To insure quick starting of this engine, an independent, two cylinder, horizontally opposed, four cycle gasoline engine is used. This engine develops ten horse-

(Continued on page 298)

Field NOTES

Safe Wooden Beams For Excavating Work

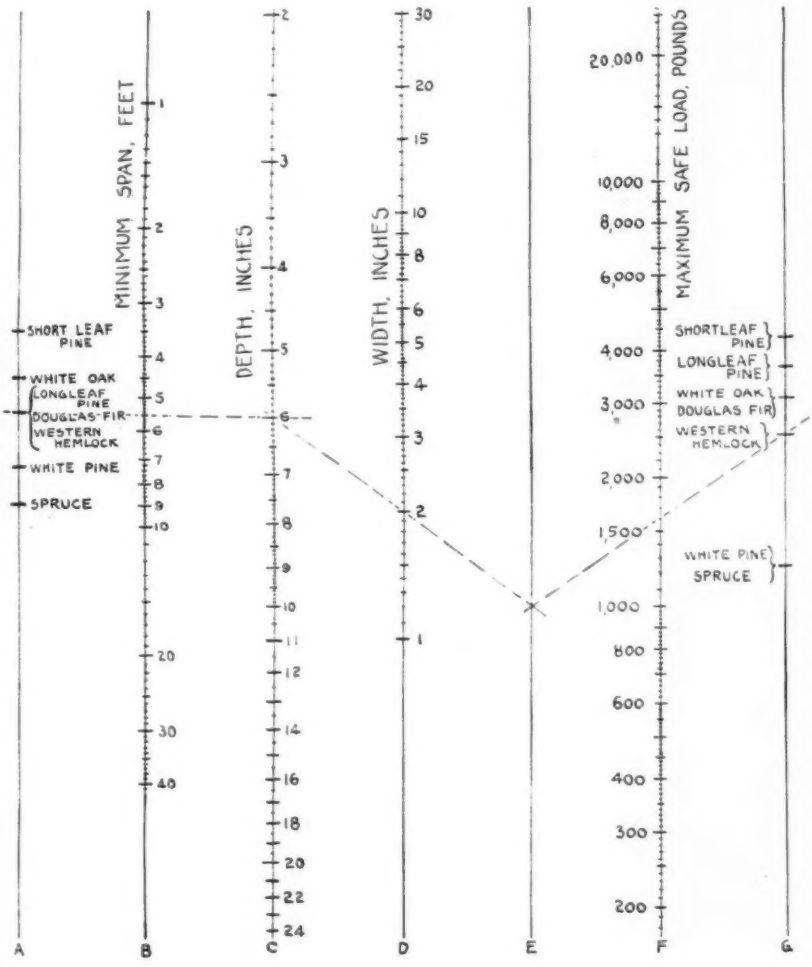
Here is a chart that will be found useful by the excavating engineer for quickly selecting safe beams made of the ordinary woods such as shortleaf pine, white oak, longleaf pine, Douglas fir, western hemlock, white pine and spruce. The chart is based on data adopted by the American Railway Engineering Association for safe uniformly loaded wooden beams of rectangular section.

To use the chart simply zigzag a straightedge across three times, or stretch a thread across three times, as indicated by the zigzag dotted line, and the problem is solved.

For example, it is desired to hold 200 lb. per ft. on a wooden beam of 2 in. by 6 in. western hemlock over a span of 5 ft. Will the beam be safe?

Run a straight line from the point in column A opposite "western hemlock" over to the depth 6 in. Column C. The intersection with column B shows the minimum span to be 5.5 ft. The beam will therefore be safe as regards span.

Then from the depth 6 in. column C run a straight line through the width 2 in column D and locate the intersection in column E. Then from that point of intersection run a straight line over to the point in column A opposite "western hemlock." The answer is found at the intersection with column F and is 1600 pounds.



Since it is desired to hold only 5×200 or 1000 lbs. on the beam, and since the beam will actually hold 1600 lb., it certainly is amply safe. In fact, the chart shows that a beam made of white pine or spruce would be safe under the load.

Inversely the chart may be used for finding any unknown factor or factors. If the kind of wood and the span are known the first straight line through columns A, B and C gives the minimum depth of beam which must be used. If the width of beam is unknown the line through the columns E, F, G is located next and lastly the line through columns C, D, E gives the minimum width of beam in column D.

The weight of the beam itself is included in the safe load given in column F.

—W. F. Schophorst, M.E.

Hints From Grand Coulee

In a recent issue of the safety sheet put out by the MWAK, under the heading "Experiments," is given some of the methods used to take care of the sticking of the very "mucky muck" to the bottom of the big trucks:

"Toward the back of the trucks is a metal bar, or "false bottom," held by a chain. When the bed of the truck is upended for dumping, the bar automatically slides down like a scraper. It does not move completely back into position automatically, however, nor is it always highly effective on the gummiest earth.

"Another device is the scraper working on 20-foot bars from an Allis-Chalmers caterpillar. The caterpillar, moving back and forth, scrapes the upended truck bed. Although such an arrangement might appear to be slow, some good results have been turned in on the much-publicized muck.

"Oil has been used on the beds of trucks and other earth-carrying wagons, but a new oil was first tried last week. The oil is one other means to combat sticking excavation.

"Last week a reconditioned and re-bricked boiler moved down

into the river area to provide steam baths. The baths are for the excavation equipment with frozen or clinging earth particles."

—Grace Kirkpatrick

Warning Flag Staff

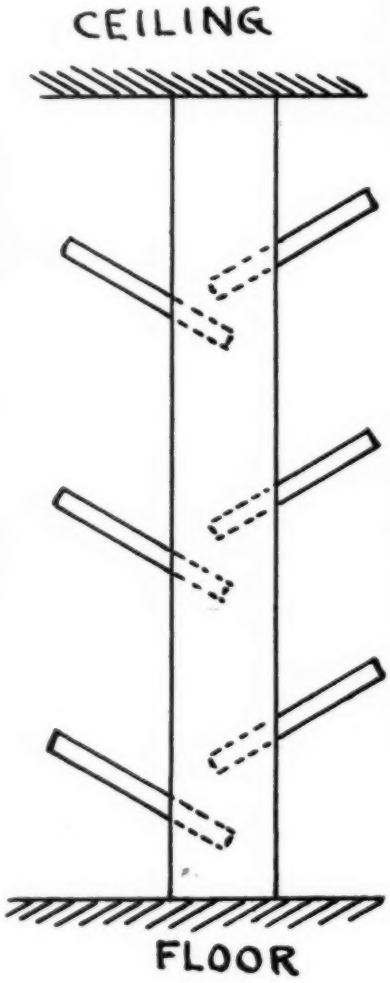
IT IS often necessary to place a red warning flag in spots where the soil is loose, in sand, or on snow-covered ground which is frozen, and into which the end of the staff cannot be forced.

Take an old broom, cut the handle off to suitable length for a staff on which to tack the red flag. Cut off the broom straws at the bottom of the sweep up to the first of the usual three rows of binding cord or twine. This affords a convenient knob or end on the bottom of the staff, around which snow, sand or loose soil is easily packed and stamped solid with the feet. Even fine snow can be hilled around this base so firmly that no amount of wind pull on the flag from any direction can pull or blow the flag out of position.

—Frank W. Bentley, Jr.

A Strong Balanced Rack

It is sometimes dangerous to attach a rack to an ordinary wall and then pile heavy materials on the rack. It is poor practice because a "one-sided" pull is created. Such a load is an "eccentric load," and eccentric loads on columns or walls sometimes end in disaster. If a similar rack could be attached to the other side of the wall and both sides loaded equally and simultaneously there would be no eccentric load and the possibility of collapse would be materially lessened.



Herewith is a sketch of a strong rack that I have used successfully. I piled heavy materials on it—pipe, bars, angles, and lumber, and it never yielded in the least.

To make a rack of this kind, bore holes in sturdy upright timbers at a slight angle as indicated in my sketch. Insert short pieces of pipe to fit nicely in the holes as shown, fasten the vertical timbers both at the top and bottom, and you have a good serviceable rack capable of holding a tre-

● On isolated jobs it may be hard to keep drinking water for the workmen cool in summer. These wooden barrels, with spigot at the bottom, were covered, inside and out, with ½ inch wire netting and plastered with cement. They serve the purpose remarkably well.

An Owen will Open new channels of profit for YOU!
OWEN
CLAMSHELL BUCKETS
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Write for NEW Catalog
Much more versatile than you perhaps realize, an Owen Bucket will handle a greater range of work profitably than any other kind and type of bucket.
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For your convenience in writing to the Owen Bucket Co., you will find a card bound in this issue.

mendous load. By placing shelves on both sides and then loading both sides the desired balance is obtained as mentioned above.

—W. F. Schaphorst.

Building Up Drive Sprockets

Drive sprocket and idler wheels wear fast in the sand along the All-American Canal. A medium hard rod is usually used in building them up, and with a careful job little if any grinding is required. At the M.U.W. shops (Imperial Dam) they are placed for welding in vee blocks of 1 inch plate, the bearing edges of which are brazed to prevent damage to the shafts. The spline end of the shaft is protected from bits of hot metal by a curved piece of sheet, supported on a rod welded to the trestle top. Width of the drive sections of the sprockets is guaged by two sections of ½ inch plate, welded on two small channels which extend beyond the plates and are joined by a rod, welded to one and threaded at the other end for an adjustment nut. A welded rod loop at the other end of the channels slips over the shaft and against the collars. Circumference of the wheel is checked from time to time with a semi-circular template of light metal, with a hand hold punched in the top edge.

—Joseph C. Coyle

It Pays to be Specific

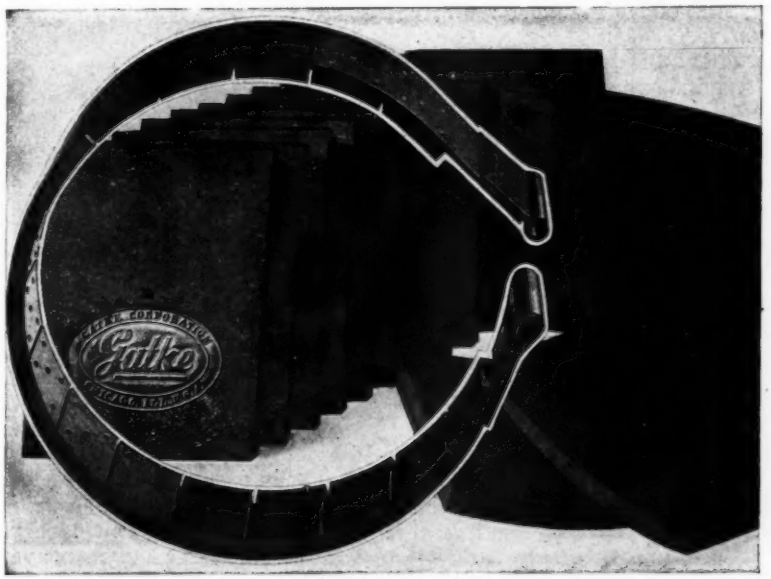
Much as brevity in contracts is to be desired, it does not pay to be brief to the extent of leaving the meaning of terms uncertain.

To illustrate, a channel dredging subcontract called for a minimum depth of 22 feet. The general contractor, by supplemental agreement, undertook to do the "final sweeping." Omission of a definition of "final sweeping" led to a lawsuit between the parties. The general contractor insisted that it meant running over the bottom of the channel with a steel rail to level down shoals of sand or gravel and to determine whether or not the subcontractor had left ledges or rock projecting above the 22-foot level. On the other hand, the subcontractor claimed that "final sweeping" meant that the general contractor must himself remove rock or ledges projecting up the 22-foot level. The trial judge, being "at sea" under these conflicting claims, left it to a jury to say which version was correct. The jury decided in favor of the subcontractor, and the United States Circuit Court of Appeals, Sixth Circuit, said that there was sufficient evidence to support the verdict. And that was that. (United Dredging Co. v. United States, 81 Fed. 2d, 118.)

If that had been the only question in the case, the subcontractor's right to $30,000 extra compensation would have followed the court's decision. But there were other circumstances that led the Circuit Court of Appeals to a conclusion that the subcontractor was not entitled to recover. These circumstances were that the so-called extra work had been so performed that the general contractor was not apprised that any claim for extra compensation would be made.

—Arthur L. H. Street

OPERATIONS... *Speeded Up!*



That's what operators of Shovels, Drag Lines, Hoists and Cranes say about Gatke Moulded Asbestos Brake Blocks.

"Before using your Frictions," says one operator, "We experienced NOTHING BUT TROUBLE. *We haven't had any diffculty since."*

But that's typical of Gatke Performance. Gatke Asbestos Brake Liners & Frictions assure:

- **Better control with less effort.**
- **Unbelievable Long Wear.**
- **Smooth operation without Grab or Chatter.**
- **Fewer Adjustments.**
- **More Brake, Clutch or Friction service**

WRITE FOR COMPLETE INFORMATION

GATKE CORPORATION
228 N. La Salle Street — Chicago, Illinois

For your convenience in writing to Gatke Corporation, you will find a card bound in this issue.

NOT in the *Contract*

A self-styled reformer was watching a trench being dug by modern methods. He said to the superintendent:

"This machine has taken jobs from scores of men. Why don't you junk that machine and put 100 men in that ditch with shovels?"

"The superintendent promptly retorted: "Or better still, why not put a thousand men in there with teaspoons!"

Doctor (to oiler who has been carried in after an accident): "Yes sir, you had a very bad smash, but I managed to bring you to."

Oiler: "I don't remember. Do you mind bringing me two more?"

"Why does Geraldine let all the boys kiss her?"

"She once slapped a lad who was chewing tobacco."

"How's business?" a traveling salesman asked the quarry superintendent.

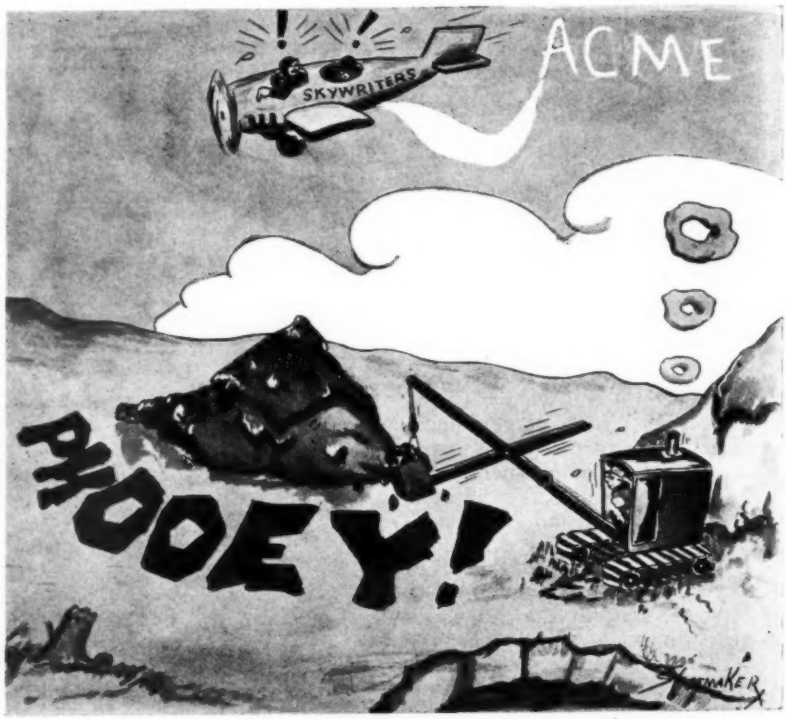
"Boy," replied the Super, "it's so quiet you can hear the notes drawing interest clear down at the First National Bank."

A young lawyer attended the funeral of an eminent financier. A friend arrived at the funeral a little late, took a seat beside the lawyer, and whispered: "How far has the service gone?"

The lawyer nodded toward the clergyman in the pulpit and whispered back: "Just opened for the defense."

From a recent newspaper story we learn: "The eight lanes of New York's Triborough bride can accommodate 57,000 vehicles a day."

We were sitting in a dentist's office the other day when some guy looked up from the paper he had found on the table and said brightly: "Well, I see there's been some fierce fightin' around that Argonne forest."



"Lookit the smart guy down there, Alec."

"She is a nicely reared girl, isn't she?"

"I should say so. Not bad from the front either."

A very prominent man recently died and shortly after a friend of the family called to condole the widow. The caller had been a very warm friend of the deceased, and as he was about to depart he asked:

"Did Will leave you much?"

"Oh yes, indeed," replied the widow, "nearly every night."

Contractor (who has telegraphed a sizable bet on a race to his bookie, and just learned that his horse paid off at 20 to 1): Did you get that wire off O.K.?"

Stationmaster: Sure, but the money you gave me was a dime short so I left out the name of the horse.

Teacher: "How old would a person be who was born in 1890?"

Smart Kid: "Man or Woman?"

"It's wonderful what some insects can do. A grasshopper can jump 200 times its own length."

"That's nothing: I once saw a wasp raise a 200-pound man three feet off the ground."

"Why didn't you catch that guy? You had bloodhounds!"

"Well, could I help it if he was anemic?"

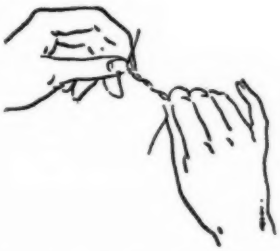
(Found in the archives of the County Clerk of Fulton County, Lewiston, Ill., period about 1840.)

State of Illinois: ss.
Peoria County

To all the world greeting:—Know ye that John Smith and Poly Myers is hereby entitled to go together and do as old folks does anywhere inside Coppers pricinct and when my commission comes I am to marry 'em good and date 'em back to kiver accidents.

(Signed) O.B.R.
Justice of Peace.

Taking the Switch at 3 miles a second



EASY as twisting a wire . . . the split ends of Cordeau-Bickford Detonating Fuse can be wrapped around the main line without the slightest trouble. The end of each branch line is slit back about four inches with the Cordeau slitter and opened up in the form of a V. The main line is pressed *firmly* against the TNT in the fork, and the slit ends are wound *tightly* about it.

These connections, when made with reasonable care, will carry the lightning-swift detonating wave of Cordeau—traveling 17,500 feet per second—directly into each bore hole and into each cartridge.

THE ENSIGN-BICKFORD COMPANY
CB72 SIMSBURY, CONN.

CORDEAU·BICKFORD *Detonating Fuse*

For your convenience in writing to The Ensign-Bickford Company, you will find a card bound in this issue.

Shots from the FIRING LINE

Shasta Dam Advertised

Bids for building giant Shasta Dam and power plant on the upper Sacramento River near Redding will be opened June 1 by the Bureau of Reclamation at the Central Valley Project office in Sacramento.

Shasta Dam will be the second largest concrete dam in the world, exceeded in height only by Boulder Dam on the Colorado River and exceeded in mass only by Grand Coulee under construction on the Columbia River.

Commissioner of Reclamation John C. Page, in the official call for bids, announced the work will include excavating about 3,215,000 cubic yards of earth and rock to prepare a foundation for the dam; placing 5,610,000 cubic yards of concrete and 26,000,000 pounds of reinforcement steel in the dam and powerhouse; and installing 13,600,000 pounds of large penstock and outlet pipes, 8,000,000 pounds of small tubing for cooling and grouting, and 12,870,000 pounds of steel gates and control mechanisms.

Other items include over 1,600,000 cubic yards of rock and earth fills, 1,500,000 cubic feet of pressure grouting, 370,000 linear feet of metal sealing strips, 3,200,000 pounds of trashracks, 935,000 linear feet of electrical conduit and 166,000 linear feet of electrical cable.

A guarantee in the sum of $2,000,000 will be required with each bid. The bidder to whom the contract is awarded will be required to post a performance bond of $5,000,000, as well as a payment bond of $2,500,000 to assure against default on labor and material bills.

The contractor, who must start work within 30 days after the Government gives official notice to proceed with construction, will be allowed 2,000 calender days, or about 5½ years, to complete the job.

Printed copies of the specifications for the dam are in Sacramento; Denver, Colorado; and Washington, D. C.

Walker R. Young, construction engineer of the Central Valley Project, said Shasta Dam will rise 560 feet from the lowest foundation to the top—higher than the tallest skyscrapers of San Francisco and Los Angeles—and will be about 3,400 feet, or almost two-thirds of a mile long on the crest. It will be 580 feet thick at the base.

The structure has been designed as a gravity-section concrete dam with a slightly curved axis. It will have a 375-foot overflow spillway in the center, 15 river-regulating outlets through the dam, and five 14-foot diameter penstocks leading to a 350,000-kilowatt power plant below the dam on the west bank of the river.

Shasta Dam will back up the waters

● A Caterpillar Auto Patrol spreads gravel on a surfacing job. Contractor: Saxon, Looney, Risley Company, of Portland, Oregon. Location: River Drive on south side of Crater Lake in Crater Lake National Park. Elevation: 7000 feet.

...IN A *hurry!*

For all types of short-job work, the mobility and "movability" of the Bucyrus-Erie 5/8-yard adds to its profit-making possibilities . . . Under its own power, this machine travels nearly two miles per hour. It climbs steep grades—maneuvers readily, even in cramped quarters — and cuts on-the-job moving time . . . This famous 5/8-yard is so compact that it can be hauled easily on a platform-type truck trailer, or the special Bucyrus-Erie trailer built for it. Its overall height is low enough to assure clearance under trees, wires, etc. Its narrow width (special treads are available to keep maximum overall width within 8-feet) and its comparatively light weight makes it easy to meet highway requirements . . . In the photo above, the 5/8-yard owned by Edward T. Dwyer of East Braintree, Mass., finishes its gravel pit job and then (lower photo) rolls easily to the truck platform for high-speed transportation to the next job.

5/8-Yard Shovel, dragline, clamshell, crane, dragshovel, skimmer scoop, backfiller, pile driver. Gasoline, Diesel or electric power. Weighs 16 tons; travels 1¾ M. P. H.; swings 4¾ R. P. M. on hooked, conical rollers; 37 ball or roller bearings; automatic lubrication. Write for complete, illustrated bulletin.

BUCYRUS ERIE

BUCYRUS - ERIE

SOUTH MILWAUKEE, WISCONSIN, U. S. A.

For your convenience in writing to Bucyrus-Erie Co., you will find a card bound in this issue.

of three rivers—the Sacramento, Pit and McCloud—a distance of 35 miles, to create a conservation reservoir with a storage capacity of 4,500,000 acre-feet which will be used for multiple benefits of improved irrigation, flood control, navigation, salinity repulsion and power generation.

To permit an early start of work on the dam, a diversion tunnel is to be constructed through the west abutment of the dam site in the Sacramento River Canyon. Bids for boring of the tunnel which first will be used to carry Southern Pacific Railroad traffic past the dam site and later will be used for bypassing the flow of the river, have already been advertised.

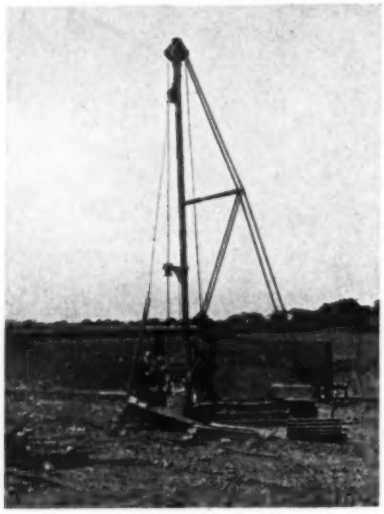
English Quarry Doubles Drilling Speed

The two accompanying pictures show stripping and drilling operations at the Penarth, South Wales quarry of the Associated Portland Cement Manufacturers, Ltd.

At this limestone quarry, the material consists of layers of blue lias (limestone) and shale; the layers being about 12 inches thick in a face varying from 40 to 60 feet in depth.

The Ruston-Bucyrus 21-B is removing the 8 feet of overburden from the top of the quarry face for the drill to put down holes of 6½" diameter. Both machines are giving extremely good results. While the material is fairly easy for the Bucyrus-Armstrong drill, it is interesting to note that this rig replaced an old manila line rig and in doing so increased the footage drilled per hour by well over 100%. An average footage of approximately 8 feet per hour is maintained; 10 feet 6 inches per hour being recorded at times.

Home office of Portland Cement Manufacturers is Portland House, Tothill St., Westminister, London, S. W. I.



● **The blast hole drill at the left puts down 8 feet of 6½-inch hole per hour for The Associated Portland Cement Manufacturers, Ltd., at their Penarth, South Wales, quarry. Eight feet of overburden is stripped before drilling by the 21-B shovel.**

Deer Creek Dam Award

Secretary of the Interior Harold L. Ickes has announced approval of the award of the contract for construction of Deer Creek Dam and the relocation of railroad and highways in the reservoir area of the Provo River Project in Utah to Rohl-Connolly Company of Los Angeles on its bid of $2,189,096.50.

Although the contract has been approved for award, the actual award will be held in abeyance and the notice to proceed under the contract will not be given until the required right of way has been obtained, and until satisfactory arrangements have been made with the Provo Reservoir Company for the enlargement of the Provo Reservoir Canal; with the Utah Power and Light Company and the Weber River Water Users' Association for the use of power water and the Weber-Provo Diversion Canal; and with the Utah state highway department for the relocation of the highway around the Deer Creek Reservoir.

Twelve proposals, of which that by the Rohl-Connolly Company was low, were received and opened by the Bureau of Reclamation at its Salt Lake City office.

This work will be the first construction and the dam will be the major engineering feature of the Provo River Project, which is designed to provide a source of supplemental water for lands now irrigated in the vicinity of Provo and Salt Lake City and the domestic supplies of the cities of Provo, Oren and Salt Lake City. Deer Creek Dam, on the Provo River near Charleston, will create a reservoir with a capacity of 150,000 acre-feet of water. It is expected to yield 100,000 acre-feet annually through conservation of the flow of the stream. In addition, surplus waters of the Duchesne River will be diverted for storage in the Deer Creek Reservoir through a tunnel to be constructed later.

The principal features involved in the contract are the construction of Deer Creek Dam, which will be of an embankment of moistened and rolled clay, sand and gravel 150 feet high and 1,300 feet long; relocation of the Denver and Rio Grande Western Railroad around the dam and reservoir site; and the relocation of the state highway adjacent to the dam site.

The dam will have an open-channel spillway at the right abutment and the outlet works will be through the left abutment.

About 10.5 miles of railroad track must be relocated around the west side of the reservoir.

About 2,700,000 cubic yards of earth will go into the dam embankment, which will be faced with rock.

The contractor must begin work within 30 days after receipt of notice to proceed and must complete the work in 1,350 calendar days thereafter.

The Provo River Project was approved and the original funds provided by the Public Works Administration some time ago. A repayment contract covering the costs of the Deer Creek Division exclusive of the Metropolitan Water District conduit and the Duchesne tunnel was executed with the Provo River Water Users' Association June 24, 1936.

House Committee Slashes Road Funds

Reporting the annual appropriation bill, the House Appropriations Committee followed budget recommendations and cut federal-aid highway appropriations almost in half. The committee reduced federal-aid grants to the states from $150,000,000 to $63,000,000 and the appropriation for forest roads and trails from $12,500,000 to $7,000,000. The $2,500,000 provided this year for public lands roads was completely eliminated, but increases were granted for farm-to-market roads (from $5,000,000 to $10,000,000) and for

grade crossing eliminations from $10,000,000 to $20,000,000.

The report points out that since federal aid allocations are obligations of the government additional appropriations must be made as payments fall due. The effect of the reduction is to divide the annual appropriation into two or more parts.

In view of the appropriations committee action, highway supporters have been asked by various groups to rally to the support of the Cartwright Bill (H.R. 1014D) for federal aid to highways in each of the fiscal years 1940 and 1941. This bill provides funds for each of those years as follows:

Regular Federal Aid	$125,000,000
Secondary Roads	25,000,000
Grade Crossing Elimination	50,000,000
Forest Highways	14,000,000
Public Lands Roads	2,500,000
National Park Roads	7,500,000
National Parkways	10,000,000
Indian Reservation Roads	4,000,000
Total	$238,000,000

To Issue Pensacola Dam Bids

Bids for Pensacola Dam, on the Grand River in Oklahoma, will be ready for issuance about May 1, and will be received about one month later. The dam will be for flood control and power development. Grand River Dam Authority is in charge of the project which is financed by a $20,000,000 P. W. A. grant and loan.

On April 11 bids were received for construction of 4½ miles of standard-gauge construction railroad bridge over the Grand River. Bids on other preliminary work, including a transmission line which will carry power to the dam site, have also been received.

California Flood Control Survey

A comprehensive survey of California's recently flooded areas will be undertaken jointly by the State of California, the United States Army and the Department of the Interior, Secretary of the Interior Harold L. Ickes has announced.

The survey, which will provide pertinent facts and figures for future flood control work as well as for the ordinary requirements of engineering and building projects of the Federal Government and the State of California, will be directed by the Geological Survey, Department of the Interior.

Reports from Geological Survey field engineers indicate that the storm and flood which inundated sections of southern California in March, following closely on the heels of the December floods in the Central Valley and northern California, were the most severe for that region for a period extending back at least to the year 1884. The Santa Ana River flood at San Bernardino was nearly twice as great as any earlier flood known there. That of the San Gabriel was 25 per cent greater than any of record, despite the two great dams now existing in its canyon, which greatly reduced the maximum flow.

● One method of cleaning up trees blown over in the recent hurricane in California is shown by this view. W. C. Watson of Lodi, uses two Caterpillar tractors and a 20-foot LeTourneau crane for the job.

The flood runoff from the five-day March storm filled Los Angeles County's fifteen flood-storage reservoirs, swept away old bridges, damaged the approaches to numerous modern bridges, and isolated the area for several days, causing, besides loss of life, property damage estimated to be well over $50,000,000. Although final details for financing the entire flood survey project have not been completed, it is highly important that the work begin immediately with the portion of funds now available, Secretary Ickes said.

Each of the Federal agencies contributing to the survey has specific projects in the California area which require detailed flood data. The Bureau of Reclamation, Department of the Interior, which is contributing $20,000 to the survey, has under construction the $170,000,000 California Central Valley project designed to control floods, aid navigation on the Sacramento and San Joaquin Rivers, provide supplemental irrigation water for about one and one half million acres of land in the San Joaquin Valley and Suisum Bay areas, and supplement the domestic and industrial water supply in that region. Many of the details of design for this project, particularly for the storage reservoirs and intakes, are based on the continuous record of river flows in the area.

In addition to a $10,000 contribution of funds and possible further financial aid from the State of California, it is expected that many local agencies of the State will co-operate in furnishing equipment and labor for the survey, and information for the final report.

New Delaware Aqueduct Bids Opened

Bids totalling $32,509,934 for construction of the first three tunnel sections of the Delaware River Aqueduct have been opened by the New York

Sauerman Drag Scraper making a circular cut 300 ft. wide in a hill of gravel.

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LONG RANGE MACHINES

WHEREVER there is a problem of excavating from pit or bank, making long cuts and fills, handling blasted ore from open pit, stockpiling, or other work involving haulage for any distance from 100 to 1500 ft.—it pays to find out what a Sauerman Slackline or Drag Scraper will do and what it will cost. In a great many cases, a Sauerman machine shows a saving in comparison with any other equipment that will dig and haul an equal yardage.

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City Board of Water Supply. Despite a 22 per cent reduction in minimum wage rates, the new bids are only 4 per cent under those rejected last November.

Reason for the continued high figures is reported to be that labor leaders informed bidding contractors that the previous high rates would still be demanded, in spite of the reduction in contract minimum.

Low bids on the second opening were: Contract 322, Utah Construction Co., $10,829,530; Contract 323, Seabord Construction Corporation, $10,810,166; Contract 324, Arthur A. Johnson Co. and Necaro Co., $10,870,238. The total of these bids, $32,509,934, compares with last Fall's total of $34,000,000 bid for the first 20 miles of tunnel.

To New Jersey Highway Bidders

State Highway Commissioner, E. Donald Stern.r has issued the following information to all prospective bidders on state highway projects:

"You are doubtless aware that extensive road building activities are being undertaken by the State Highway Department of New Jersey as a WPA Highway Program. Projects will be advertised for bids as rapidly as plans and specifications can be prepared.

"It is apparent that many prospective bidders are not informed as to the provisions of our New Jersey laws concerning the Prequalification of Bidders. Our laws require that a bidder must have filed his application not less than twenty days in advance of the date set for the receipt of bids. It is urgent, therefore, that any bidders who propose to submit bids on our highway projects file the required questionnaire and applications for rating without delay, in order that they may not be prohibited from bidding by lack of proper qualification.

"You are reminded also that bids on many of these WPA Highway Projects are advertised only one week for the purpose of expediting the receipt of bids and the placing of the work under contract at the earliest possible moment."

Setting Poles In Loose Soil

The method used by a contractor in North Carolina recently in order to set poles for a power line in soft sand whereby resort was had to dynamite illustrates a procedure effective in such work, according to Arthur La Motte, manager of the Technical Section of E. I. du Pont de Nemours & Company Explosives Department.

Difficulty is often experienced in digging post holes in soft soil, sand or swamp land flooded with water. Often caissons are required to keep water and soil from filling up the pole hole which has been dug before the pole can be set.

In such situations considerable success has followed the practice of blasting the pole hole and setting the pole in one operation. A hollow drill of about 1½" pipe is driven into the ground to the depth desired for the bottom of the pole. The soil is forced out through the lower end of the drill with a ram. A sand point on the end of the drill will help where the soil is such that it clogs the pipe, making ramming difficult. The pipe can be withdrawn leaving the sand point in the hole.

The charge of dynamite, primed preferably with an electric blasting cap, is pushed down through the pipe to the bottom and the pipe withdrawn. The pole is then raised above the surface directly over the dynamite and held in place by pike poles or rigged four ways, and the dynamite is detonated.

The explosion will create a pear-shaped pocket into which the pole will settle as the gases rush upward. The ground and water pressures press the soil back around the pole.

Some difficulty may be experienced in getting the pole to drop straight. It may be necessary to pull up the pole and blast another hole if the pole leans. The secret of settling the pole straight is in holding it straight above the ground by means of the pike poles or rigging. Care should be taken to see that the pole is exactly upright before the blast.

If the charge does not sink the pole far enough, the drill may be driven down along the pole and a second charge fired.

The amount of dynamite needed varies with the soil conditions encount-

All Perfectly BALANCED

A heavy duty wire rope must be tough enough to take plenty of punishment . . . round after round and still come back for more.

All "HERCULES" (Red-Strand) Wire Rope is tough . . . as tough as wire rope can be made without sacrificing those other equally vital factors of strength . . . elasticity . . . flexibility and durability. It is the balance of these characteristics that enables "HERCULES" (Red-Strand) Wire Rope to win the decision for you in your battle to reduce operating costs.

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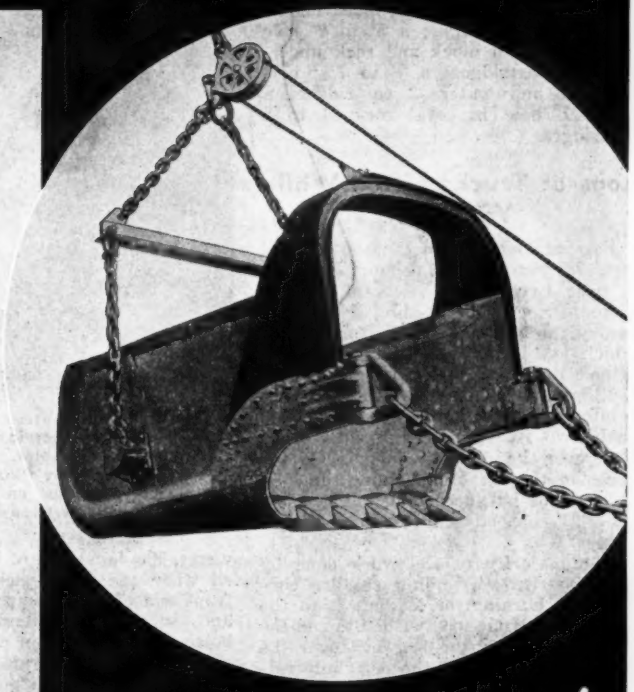

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Heat-treated Drag-bail Socket

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Light, Medium or Heavy-duty Types—
A Complete Range of Sizes... 3/8 to 14-yards.

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Excavating, Drilling, and Material Handling Equipment

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ered, but the following are suggested by experienced blasters who have done this work. In each case 40% straight dynamite is recommended: a 6' to 7' depth hole in swamp with muck underlying—2½ cartridges; a 5' to 7' hole in swamp with muck and rock underlying—3 cartridges; a 7' to 7½' hole in sand and water—3 cartridges; a 6' to 7' hole in coral rock—4 to 5 cartridges.

Logs or Trucks Lifted While You Wait

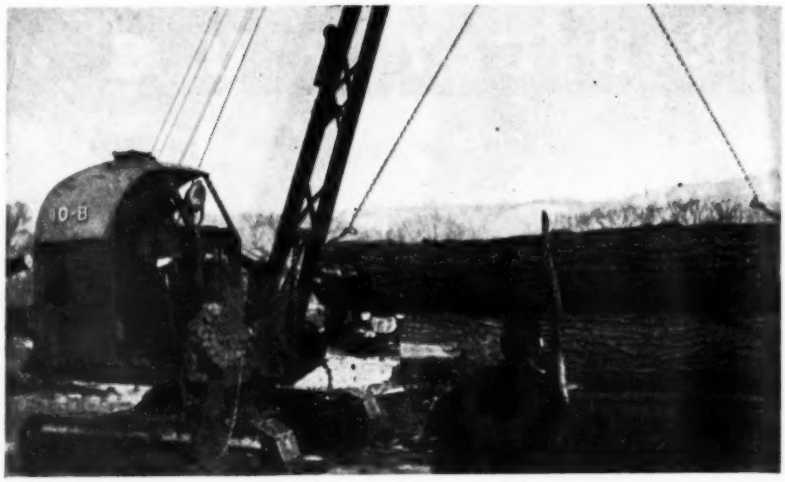
Several islands in the Mississippi will be under water when Lock and Dam No. 9, near Lynxville, Wisconsin, is completed. Prior to the flooding it was necessary to clear the islands, for part of which job Ulland Brothers of Austin, Minnesota, were called in.

Rigging up a special log-and-wire reinforcement, Ulland Brothers moved their two Bucyrus-Erie ⅜-yard draglines over the ice to the islands. On one occasion the ice broke under the load on one side but, according to the operator, "I kept steering and chased her across."

The majority of the work done by the two rigs was piling smaller timbers for burning, or loading it to the trucks of anyone who wished to run the risk of hauling free firewood over the ice. However, one of the most interesting jobs was loading man-sized logs to trucks, as shown in the accompanying picture. E. L. Ulland tells us that the logs were mostly green river elm, 10 to 16 feet long and up to four feet in diameter. The operator of the machine pictured estimates the weight of some of the logs he handled as high as 1½ tons.

A four-horse team was used to snake the logs in over the snow. "At times," according to Mr. Ulland, "the team was unable to pull the logs, and then a long drag cable from the 10-B was used to bring them in where the hoist line could reach them. Incidentally, the log in the picture was by no means the largest handled."

Mr. Ulland continues, "We might add to this another use the 10-B was put to one day. A new Dodge pickup fell through the thin ice at the edge of an island into about three or four feet of water. The hoist line of the 10-B reached when the boom was lowered. The front end of the pickup was lifted out, and, with the rear end dragging the bottom, was pulled in close enough so the boom could be raised again. Then the 'mighty atom' lifted it bodily out of the water and ice, and set it on shore."



● **Loading green river elm logs 10 to 16 feet long, and up to 4 feet in diameter, was part of the work done by Ulland Brothers two ⅜-yard rigs on this job near Lynxville, Wisconsin.**

Westinghouse Reports One of Best Years

The Westinghouse Electric and Manufacturing Company had one of its best years in 1937, despite widely varying business activity, declared A. W. Robertson, Chairman, in the annual report to stockholders.

Orders entered, sales billed and net income were all above 1936. The Company carried into 1938 unfilled orders approximately 24 per cent greater than a year ago.

Net income was $20,126,408, compared with $15,099,291 in 1936, an increase of 33 per cent, representing earnings of $7.53 a share.

Orders received amounted to $229,540,061; an increase of 25 percent over 1936 and second only to the record of $240,220,555 orders received for the year 1929.

Sales billed, which were also slightly less than in 1929, totaled $206,348,307, an increase of 33 per cent over 1936.

Unfilled orders at the end of the year amounted to $60,298,087, compared with $48,490,919 at December 31, 1936.

New Heart Mountain Canal Award

The Northwestern Engineering Company of Rapid City, South Dakota, on its bid of $173,603.70, was awarded the contract for almost five miles of the Heart Mountain Canal. The successful bid was the lowest of seven proposals received and opened by the Bureau of Reclamation at its Cody, Wyoming, office.

About 17 miles of canal and conduit, including several difficult tunnels, are now under contract. The Heart Mountain Division, fourth of five divisions of the 164,000 acre project to be constructed, contains 42,000 acres of irrigable lands, of which 38,600 acres are unentered public lands. It will be served with water stored in the reservoir above Shoshone Dam, completed when the project was first undertaken.

The construction under way at this time will serve, in part, the fifth pro-

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Here Is a Bargain
in used excavating equipment

(taken from page 300)

BUCYRUS-ERIE 19-B gas combination ⅝-yd. 45' boom clamshell and shovel. Hercules 6-cylinder 4"x4½" engine. Used less than 1 year. Excellent condition. Located Southern Indiana. Box 2099-SS.

For other bargains in shovels, draglines, cranes, locomotives, trenchers, and miscellaneous contractors' equipment turn to pages 300 to 304.

The largest listing of Used Equipment offered by any Publication Serving the Excavating Industry.

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jected division of the project, known as the Oregon Basin Division. The Shoshone Canyon Conduit, of 1,200 second-feet capacity and three miles in length, largely tunnels, will serve both the Heart Mountain Division and the future development in the Oregon Basin. The Heart Mountain Canal, however, will serve only the Heart Mountain Division. This canal has a capacity of 910 second-feet of water and will be 28 miles long.

The contract awarded today is the third to be awarded for excavation of the Heart Mountain Canal. With the exception of a short length beginning at the Shoshone Dam, all the Shoshone Canyon Conduit is under construction. The remaining piece of this conduit has been advertised for contract.

The present contract covers excavation of the canal, lining of canal sections with concrete, construction of the Iron Creek Siphon, one of the major structures along the canal, and several culverts, checks and bridges.

Safety Lighting Cuts Night Accidents in Half

Night traffic fatalities, serious night injuries, and pedestrian accidents during darkness have been substantially reduced by a system of sodium safety illumination along four miles of the George F. Johnson highway, Route 17-C, between Binghamton and Endicott, N. Y. This is revealed in a comparison of accident records recently made available for 14-month periods before and after lighting of the route by sodium and widening from three to four lanes.

Statistics obtained from the State Highway Department, covering a period from Sept. 1, 1935, through Dec. 31, 1937, show a 67-per-cent reduction in night fatalities, a 100-per-cent decrease in serious night injuries, a 75-per-cent drop in night pedestrian accidents, and a 50-per-cent reduction in all night accidents after safety lighting was installed on Nov. 1, 1936.

In the period studied, there were no fatal day accidents either before or after widening of the route, and no reduction in pedestrian accidents. Serious day injuries, however, were cut 33 per cent, and total day accidents 44 per cent.

The four-mile stretch runs through a semi-rural section between two manufacturing centers. Consequently, traffic is above average for a rural highway, and there is considerable pedestrian traffic which adds to motoring hazards. These conditions justified the widening of this three-lane concrete route to four lanes. Further, the night accident record was such that the town board provided safety illumination. This system employs units with 10,000-lumen sodium lamps developed by General Electric scientists, mounted in reflectors which direct the maximum of light to the pavement for high visibility purposes. Luminaries are spaced 250 feet apart and staggered on alternate sides of the road. The units were installed by the New York State Electric and Gas Corporation.

Traffic Safety Contest Results

Details of the traffic safety programs which brought victory to seven American cities and four states in the Sixth Annual National Traffic Safety Contest have been released by the National Safety Council.

Results of the contest were announced March 31 after judges finally had selected the winners from the 1,101 cities and 42 states which participated in the contest. Judging was done largely from examination of voluminous reports of the 1937 safety programs of the cities and states.

Judges were Thomas H. MacDonald, chief of the U. S. Bureau of Public Roads, chairman; Paul G. Hoffman, president of the Automotive Safety Foundation and of the Studebaker Corporation, and D. D. Fennell, president of the National Safety Council.

Memphis, Tenn., was awarded the national grand prize for cities. Massachusetts won the national grand prize for states.

Six other cities won first-place prizes in their population groups. They were:

Milwaukee, Wis., in the 500,000 or more population group.

Hartford, Conn., in the 100,000 to 250,000 group.

Beaumont, Tex., and Sacramento, Calif., tied for first place in the 50,000 to 100,000 group.

Everett, Wash., in the 25,000 to 50,000 group.

Des Plaines, Ill., in the 10,000 to 25,000 group.

Hercules Directors Re-Elected

At the annual stockholders meeting of Hercules Powder Company recently, all directors were re-elected for the coming year.

The directorate includes R. H. Dunham, T. W. Bacchus, and C. D. Prickett, who have served continuously on the Board since the company was organized twenty-five years ago. Other members of the Board who were re-elected are: G. G. Rheuby, L. N. Bent, C. A. Bigelow, C. A. Higgins, C. C. Hoopes, G. M. Norman, A. B. Nixon, P. B. Stull, M. G. Milliken, E. R. Ellis, L. Kitchel, P. W. Meyeringh, and E. B. Morrow.

BUCYRUS ERIE

LINKS & RINGS

IT'S easy and quick to repair broken dragline bucket chain with BECO links and rings. Just snap the link into place, burr the rivet, and the job is done. The ring revolves, spreading wear and allowing direct line pull and free movement. Every operator needs a set of these links and rings on hand. Save time and money — order *before* a breakdown occurs.

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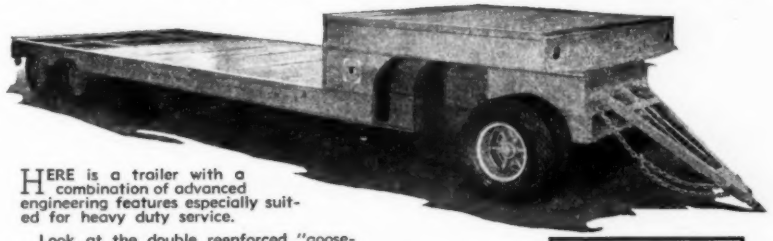
EXCAVATING, DRILLING & MATERIAL HANDLING EQUIPMENT • • SOUTH MILWAUKEE, WIS

"JAHN" Trailers Are Built To Take It!



HERE is a trailer with a combination of advanced engineering features especially suited for heavy duty service.

Look at the double reenforced "gooseneck" construction. This, combined with an unusually rigid "X" type frame, eliminates any possibility of frame sagging or kingpin failure. Recessed flooring protects ends of planking from splintering.

Equal load distribution is accomplished by multiple rear axles consisting of four oscillating type axles placed in dual tandem. Axles are designed and built with the problems of frame stresses definitely in mind and to assure the proper distribution of load and the elimination of frame distortion and frame failure.

If you're in the market for a heavy duty machinery trailer, don't fail to investigate the features these trailers offer.

Write or wire —

This is only one of the many Jahn trailers. Jahn trailer designs include complete combinations of wheel arrangements for every type of load, from 5 to 100 ton capacities.

C. R. JAHN COMPANY, 1312 Builders Building Chicago, Ill.

"Come to Trailer Headquarters"

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Book reviews

"Facts and Figures," a pocket-size manual for engineers and contractors, has been published by the **Pioneer Engineering Works, Inc.**, 1515 Central Avenue, Minneapolis, Minnesota. Tables and charts contain valuable information concerning aggregate requirements, belt conveyor data, decimal equivalents, areas and circumferences of circles, engineering constants, trigonometrical functions, pipe threads, weights and measures, squares, cube roots, square roots, and other data.

Undoubtedly the book will be appreciated by many who will save valuable time by reference to it.

Captioned pictures, showing a wide variety of jobs, both agricultural and industrial, which are being done by "Caterpillar" products, are included in a new folder, issued by **Caterpillar Tractor Company.**

Obstacles which have been overcome by the use of "Caterpillar" Diesel engines, track-type tractors or road machinery, as well as routine tasks, which are being done from Alaska to Zanzibar, are illustrated in the folder.

You can tell by looking at its lower sheave design that a

HI-POWER

is a bucket that will keep the closing line UP out of the muck, save jammed sheaves and move yardage at a profit.

It's a REAL Bucket

at a RIGHT Price

Ask for Bulletin 237 on famous HI-POWER CLAMSHELL BUCKETS

WRITE WIRE OR TELEPHONE

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Who, for over 40 years, have created and sold none but equipment of demonstrable superiority in design and manufacture.

Bucket Loaders — Portable Conveyors

A new model of the **McDonald Safety Hat**—known as type "T"—and made of duralumin (airplane metal), is now marketed by the **Mine Safety Appliances Company**, Braddock, Thomas & Meade Streets, Pittsburgh, Pennsylvania.

The duralumin shell, designed for the protection of workmen against falling or flying objects, is corrugated to provide maximum resistance to blows and, it is claimed, does not absorb radiated heat even when worn in sunlight. A leather headband is spaced from the shell to assure continuous air circulation. Cradle-straps and headbands are interchangeable.

A four-page folder on the Sullivan Featherweight Drill Rig has just been released by **Sullivan Machinery Company**, Claremont, New Hampshire. The booklet lists nine economies in operation through use of the rig and specifications are given concerning height, width, weight, etc.

A bulletin dealing with portable and utility compressors is available for distribution according to the **Chicago Pneumatic Tool Company**, New York, New York. This bulletin contains information and photographs concerning compressors, demolition tools, sinker drills, drifters, wagon drills, tampers, etc.

Broderick & Bascom Rope Company, St. Louis, Missouri, has just issued the "Riggers Hand Book" covering the subjects of how to measure slings, different types of slings, clips and fittings, sockets, hooks and links, directions for splicing, etc.

A new 42-page catalog on the complete line of Calyx Core drills has recently been issued by **Ingersoll-Rand.** This type of drill is designed for boring holes in rock and concrete in sizes from 2¼" to 72" in diameter, and depths of 2500'.

Detailed description of derricks, engines, pumps, drill heads, water swivels, cutters and bits as well as other tools are contained in the catalog, number 9501-A, copies of which may be obtained from Ingersoll-Rand, 11 Broadway, New York City, or any of their branch offices.

Air Hygiene Foundation, 4400 Fifth Avenue, Pittsburgh, Pa., has issued a pamphlet titled "Use and Care of Respirators." The bulletin points out that the most important use of "respiratory protective devices" is under working conditions "where protection is required intermittently, as in cleaning-out operations, sweeping, after blasting, in removing cores from large foundry castings, shoveling, screening and handling of materials, and the operation and maintenance of processing equipment."

Respirators, the report states, should not be considered part of the workman's own wearing apparel but should be provided by the employer; nor does the employer's duty stop there. He must see that respirators are properly distributed to all who need them and workmen "must be educated in their proper use—a difficult task which is accomplished only by incessant instruction."

The Deming Company of Salem, Ohio, has perfected a new line of completely automatic "Self-Priming" Centrifugal Pumps. The new pumps are an addition to Deming's standard line of Centrifugal Pumps. One noteworthy feature of the new pumps, claims the manufacturer, is the rapid and positive priming which is accomplished without the use of tanks, built-in strainers, hand operated controls or other mechanisms. Every priming operation is completely automatic and dependable with positive automatic shut-off for re-circulating the water. Complete details are included with performance tables in Bulletin No. 3000. Copies of this new bulletin are available upon request from The Deming Company, Salem, Ohio.

The need for highway lighting, as well as recommendations to meet this need, are covered in a new eight-page bulletin GEA-1097B published by the **General Electric Company.** Illustrations and descriptions of luminaires and accessory equipment include discussion of arrangement and mounting heights of units. The booklet further recognizes the significance of the different road surfaces, colors, and widths.

Line diagrams illustrate the construction of recommended mast arms and steel poles. Tables indicate prices of different parts listed.

"Pressure Lubrication Without Special Fittings" is the title of a folder which illustrates and describes the Acco-Morrow Pressure Lubricator, recently announced by **American Chain & Cable Company, Inc.**, York, Pennsylvania.

It shows how pressure lubrication is possible even with common oil holes and without the use of any special fittings because of the "oilingseal" tip which is an intregal part of the lubricator. The Acco-Morrow Pressure Lubricator is made in ten styles—including, according to the manufacturer, an oiler type which provides pressure of over 500 pounds and a gun type which gives a pressure of 1,000 pounds.

The 1938 Edition of **State Restrictions on Motor Vehicle Sizes and Weights** has just been released. The contents include charts and data on legal maximum size limits, legal maximum gross weights, recommendations of American Association of State Highway Officials, etc. The booklet may be obtained by sending one dollar to National Highway Users Conference, National Press Building, Washington, D. C.

For your convenience in writing to George Haiss Mfg. Co., you will find a card bound in this issue.

BUCYRUS-MONIGHAN

STABILITY - anywhere!

EVERY move the Bucyrus-Monighan walking dragline makes is a time saver. Every step leads to stability on any ground that will support a man. On the world's biggest excavation projects, on strip mining operations, through every season of the year, the Walker is always "on top of the bank, and on top of the job!" . . . Manufactured by Bucyrus-Monighan Company, Chicago, Illinois.

● Resting solidly on its huge circular base — ready to step away from trouble or maneuver to a new working position in a moment — this 10-W dragline swings into a big output pace in stripping overburden for Maumee Collieries, Terre Haute, Indiana.

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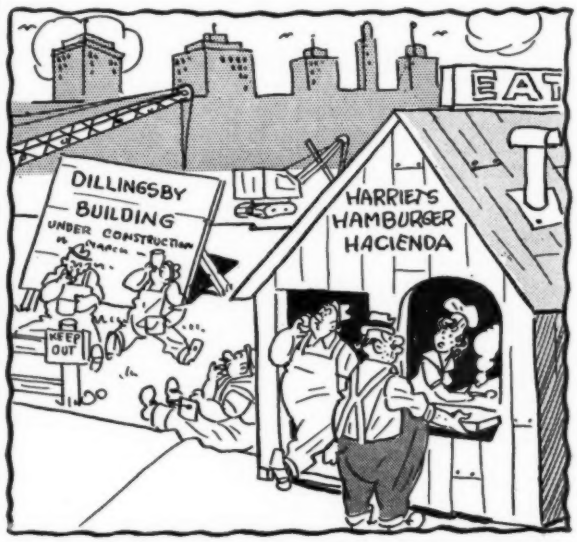
"It's Mabel Jones — 1399 E. 27th Street — Telephone is Broadway 6817."

"I never yelled 'Help' young man — I said 'Hell'!"

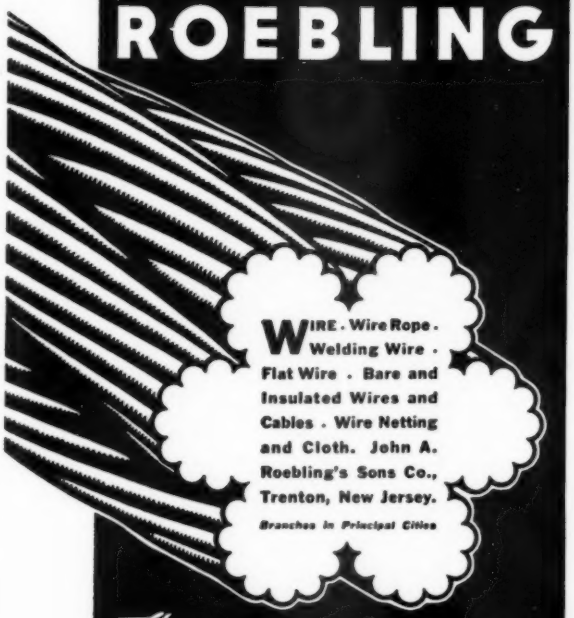
"Junior is right at the age where he likes to take things apart."



"I never said your credit wasn't any good Mr. Mulroy — I just said I don't trust you!"

"This excellent idea of your having Jeeves work for your construction company in the daytime and chauffeur at night has him all mixed up."

ROEBLING



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Branches in Principal Cities

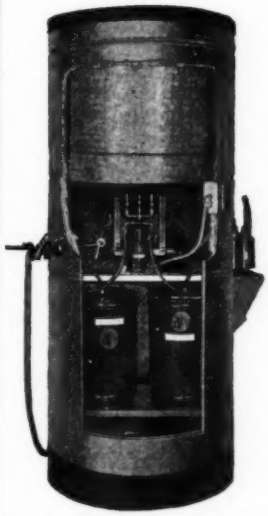
The pacemaker in wire rope development

JR

STOP THROWING

Good Money

~~USED OIL~~ AWAY



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Why? Because you can reclaim up to 90 percent of your used oil at an average cost of about 9 cents per gallon. Electrically operated and semi-automatic, this self-contained unit can be delivered to you for less than $350 (in U.S.A.). It will pay you to investigate the BIG savings it can make for you.

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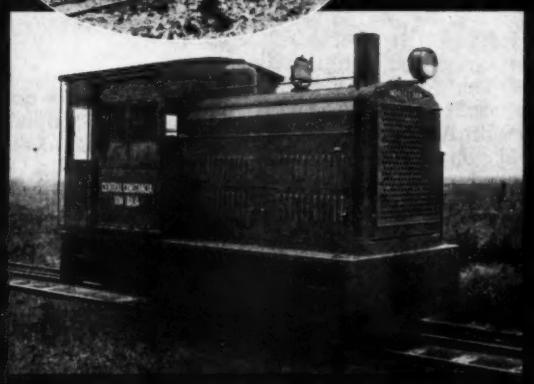

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Subsidiary of The Baldwin Locomotive Works, Paschall Station Post Office, Philadelphia, Pennsylvania

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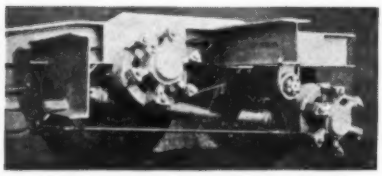
Equipment You Ought to Know About

(Continued from page 280)

power at 3,000 RPM. An unusual feature of the engine is the twin radiator—one is for cooling the water, and one for cooling the lubricating oil.

Equalizing Brakes for Heavy Duty Trailers

Rogers Brothers of Albion, Pennsylvania, claim to have developed, for heavy duty trailers, a system of brakes that completely eliminates the possibility of brake "grab" and brake "walk," caused by axle oscillation of multi-tired, rear units which resulted in unreliable and ineffective braking.



The Rogers Equalizing System of Brakes, (Patent Applied For) utilizes compensating levers which "give" and "take" as the axles oscillate, thus control rods are kept constantly in proper tension for instant application and release of the brakes under all conditions. Power is applied with the accepted air or vacuum units.

Two-Cylinder Gasoline Engines

The Hercules Motors Corporation of Canton, Ohio, in announcing the "NX" series engines and power units has added two models of two-cylinder, heavy-duty gasoline engines and power units to its present line of four and six-cylinder gasoline and Diesel engines. The internal dimensions of the "NX" are as follows:

Model	Bore	Stroke	Displacement
NXA	3	4	56.5
NXB	3¼	4	66.3

These two engines are identical in general design and the majority of the parts are interchangeable, the only difference being in the bore size and the parts affected thereby. The maximum torque of the "NXA" is 39 pounds feet at 1100 RPM, and the maximum torque of the "NXB" is 46 pounds feet at this same speed. For continuous peak load service both models can be operated up to 1800 RPM, at which speed the "NXA" develops 12.4 and the "NXB" 14.7 corrected horsepower.

Oil-Proof Conveyor Belt

An oil-proof conveyor belt is now being manufactured by The Manhattan Rubber Mfg. Division of Raybestos - Manhattan, Inc., Passaic, New Jersey.

Paranite - G. O. P. (Gas - Oil - Proof) Conveyor Belts contain no natural rubber and are not affected by oil according to the manufacturer. The Manhattan friction compound of Paranite-G.O.P. material covers both sides and resists abrasion of the material carried as well as oil. These belts are made in regular conveyor widths, plies and covers.

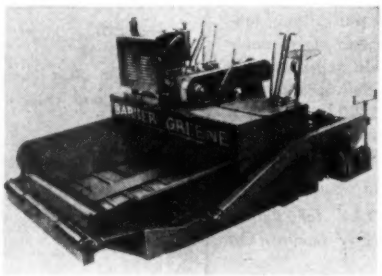
Trailer Tire

The Firestone Tire & Rubber Company has introduced a new tire designed and built especially for trailer and semi-trailer equipment.

In the creation of the trailer tire, it was necessary to develop a special tread design to fit the road and to resist side skid. The five-ribbed tread is contoured with a double radius, being flat in the center and flaring to the shoulders. Ribs and shoulders are reinforced with buttresses to provide stability under heavy load.

Tamping-Leveling Finisher

The Tamping-Leveling Finisher has been released by Barber-Greene Company, Aurora, Illinois. It automatically levels without forms, lays to grade, and levels and compacts simultaneously. Its tamping, says the manufacturer, gives a permanent uniform density which greatly reduces and simplifies rolling and which will



not reflect sub-grade irregularities under rolling or traffic. The machine normally lays 10′ wide, but cutoff plates can quickly be attached for 8′ or extensions added for 12′. Complete information can be obtained by writing Barber-Greene Co., Aurora, Illinois.

San Francisco Exhibit Palaces

(Continued from page 269)

supporting the arch proper were assembled as three separate panels, raised into position, and bolted together to form a cross section resembling a letter "H" 20 feet square and 70 feet high.

Two arch members reaching an additional 34 feet were to be set down on top of these towers, and since this would exceed the capacity of either crane with an 85-foot boom, one crane was taken out of service and the center section of its boom was added to that of the other rig, thus giving just sufficient length to reach above the center of gravity of the arch. Rigging methods had been worked out from a model six feet tall so that erection progressed smoothly. Panels of byrkit sheathing were framed on the ground and placed by the 100-foot boom with a 70-foot pile as a jib extension.

Third Contract Now Under Way

A third contract is just getting under way for the framing around the steel skeleton of the central tower which forms an octagon 65 feet across at the base involving many setbacks and battered surfaces before tapering to a spire 392 feet above the ground. Full scale drawings are being made, from which patterns will be made of plates, sills, braces and other members to be cut in the mill. Most of the panels will be assembled on the ground and hoisted into position by an electric hoist at the base.

A 43-B Bucyrus-Erie crane and a 75 Thew-Lorain Crane were also used on this work.

This work was under the immediate supervision of E. L. Kier, Vice-President of Guy F. Atkinson Company, and the following organization: D. E. Root, Chief Engineer; J. C. Moore, General Superintendent; J. C. Standish, Erection Superintendent; Pat O'-Bar, Master Mechanic, and J. J. Nunn, Office Manager.

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BUCYRUS ERIE

trade notes

John B. Rice, manager of the San Francisco office of the **Hercules Powder Company** for the past 25 years, has resigned and is now serving the company in an advisory capacity. Mr. Rice is succeeded by J. B. Johnson, his assistant and former manager of the Hercules California plant.

Chicago Pneumatic Tool Company announces the moving of its Buffalo Sales and Service Branch to 128 West Chippewa Street, Buffalo, New York.

J. K. B. Hare, has been appointed Central District Manager of the **Westinghouse Electric & Manufacturing Company.**

Mr. Hare, who has been with Westinghouse since 1919, will have charge of the sales district of the company whose headquarters are in Pittsburgh and whose territory includes the tri-state district reaching as far West as Detroit.

The Buda Company of Harvey, Illinois, has just announced the appointment of J. S. Innes, Ltd. of Bay and Yorkville Streets, Toronto, as exclusive representatives in the Province of Ontario. The Innes organization will handle the complete line of Buda Gasoline and Buda-Lanova Diesel Engines for industrial, automotive and marine use.

Promotion of Denn M. Burgess to the position of Domestic Sales Manager from that of Eastern Sales Manager has been announced by **R. G. LeTourneau, Inc.**, Peoria, Illinois and Stockton, California.

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UNIVERSAL—THEW Model AC-35, ½-yard gasoline truck crane. 28' boom. ½-yd. Owens digging bucket. Mack truck equipped with dual hard tires rear and pneumatic tires front. Condition good. Located Central New York State. Box 1193-SCC

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½-YARD

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BUCYRUS-ERIE — TYPE A, ½-yard steam shovel. Cat mounted. 26' boom clamshell equipment. Located Central Illinois. Box 2007-SS.

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MEAD MORRISON ½-yard Gas Shovel and 35' boom dragline including ½-yd. Page drag bucket. Good operating condition. Located Minnesota. Box 2081-SS.

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BUCYRUS-ERIE 19-B Gas Combination ⅝-yd. shovel and 45' boom clamshell. Electric starter. Hercules 6-cylinder 4"x4½" engine. Used less than 1 year. Excellent condition. Located Southern Indiana. Box 2099-SS.

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BUCYRUS-ERIE Type A steam shovel. 16' boom. 12'6" dipper handle. ⅝ yard shallow cut dipper. Two speed propelling mechanism. Hand operated boom hoist. Located vicinity New York. Box 958-SS.

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BUCYRUS-ERIE TYPE B steam shovel. High lift. Boiler reported good condition and machinery generally in fair condition. Located Rockford, Illinois. Box 963-SS.

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BUCYRUS-ERIE (2) TYPE "B" HIGH LIFT Caterpillar mounted Steam Shovels. Good operating condition. Located Eastern Pennsylvania. Box 1014-SS.

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BUCYRUS-ERIE TYPE B steam ¾-yard shovel and 36' boom clamshell including ¾-yard Williams clamshell bucket. Located Central New York. Box 1188-SS.

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NORTHWEST MODEL 105 Combination shovel and clamshell. 24' shovel boom. 17½' dipper handle. ⅝-yard dipper. 40' clamshell boom. Type "C" Lakewood 1-yard clamshell bucket. Twin City gasoline engine. Reasonably good condition. Located near Chicago. Box 2045-SS.

OSGOOD — GASOLINE — COMBINATION shovel, clamshell, and dragline equipped with electric starter. Shovel Boom 19'6"—Dipper Handle 14'—Dipper 1 yard standard and 1½ Beet Loading Type. 40' Clamshell and Dragline Boom. Hercules 6 cylinder 85 H.P. engine. Fair condition — good appearance. Located Colorado. Box 1018-SS.

OSGOOD. COMMANDER. Combination shovel, dragline and clamshell. ¾-yard Rock Type dipper. 35' dragline and clamshell boom. ⅝-yard Page drag bucket. Hercules 6-cylinder 4½"x4½" engine. Completely rebuilt recently and new engine installed. Bucket very good. Will sell on terms. Located Texas. Box 2038-SS.

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BUCYRUS-ERIE B-2. Extra High Lift shovel. 21'3" boom. 18'4" dipper handle. ⅞-yard dipper. Well cared for. Good condition. Located Rhode Island. Box 2047-SS.

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BUCYRUS-ERIE TYPE B-2, ⅞-YARD high lift steam shovel. Located Lawrence, Mass. Box 1090-SS.

2—BUCYRUS-ERIE—B-2—HIGH LIFT STEAM shovels. 21'3" booms, 16' dipper handles, ⅞-yard dippers. Power boom hoists. Single shaft caterpillars. Located Massachusetts. Box 1119-SS.

BUCYRUS-ERIE—B-2—HIGH LIFT STEAM shovel. 21'3" boom, 16' dipper handle, ⅞-yard dipper. Single shaft caterpillar. Located Vermont. Box 1135-SS.

BUCYRUS-ERIE—Type B-2 Steam Shovel. Reported fair operating condition. Located near Boston. Box 1157-SS

BUCYRUS-ERIE—TYPE B-2 high lift steam shovel. 19'9" boom—16' dipper handle—⅞-yd. dipper. Cat. mounted. Reasonably good condition. Box 1175-SS

MARION MODEL 21 — ⅞ CUBIC YARD steam shovel. Caterpillar mounted. Good working condition. Located Georgia. Box 758-SS.

1-YARD

BUCYRUS-ERIE 32-B Gas Combination Chain Crowd Shovel—clamshell, dragline and lifting crane. Electric starter. Wisconsin high altitude engine. Considerable quantity spare parts available. Located South Dakota. Box 2098-SS.

BUCYRUS-ERIE 32-B—Gasoline chain crowd 1-yard shovel. Electric starter. Single shaft cats. Wisconsin 6-cylinder 5"x6" engine. Few minor repairs needed. Otherwise excellent condition. Located near Boston. Box 2061-SS.

BUCYRUS-ERIE GA-2 GAS-AIR SHOVEL 22'6" boom—16' dipper handle—one yard dipper. Waukesha four cylinder 5¾"x8" engine. Overhauled approximately one year ago. Fair condition. Located Knoxville, Tennessee. Box 870-SS.

BUCYRUS-ERIE—GA-2 Gas-Air High Lift 1 yard shovel. Air starter. Single Shaft Cat. Fair condition. Located Western New York. Box 996-SS.

BUCYRUS-ERIE GA-2 COMBINATION shovel and clamshell. 24' boom. 18'4" dipper handle—1 cu. yd. cast front inserted tooth dipper. 45' boom. Complete clamshell equipment including 1 yard Williams Fav. Clamshell bucket. Air starter. Single shaft cat. Waukesha 4 cylinder 5¾"x8" gas engine. Fair operating condition. Located Eastern Pennsylvania. Box 932-SS.

BUCYRUS-ERIE GA-2 — Gas-air — high lift shovel. Good operating condition. Located Eastern Pennsylvania. Box 945-SS.

BUCYRUS-ERIE 1030 — ELECTRIC TUNNEL shovel. Boom 10 ft. 7 in. Dipper handle 10 ft. 5 in. 1-yd. dipper. Boom hoist 5 ft. 6 in. rear end clearance. 2 motor—power supply 3 phase, 60 cycle, 440 volt. Located Virginia. Box 1068-SS

BUCYRUS-ERIE—D-2 1 yard Diesel Shovel. Atlas engine. Field reconditioned. Located North Carolina. Available approximately 30 days. Box 1079-SS.

BUCYRUS-ERIE GA-2 SHOVEL AND CRANE 22 ft. 6 in. shovel boom, 16-ft. dipper handle, 1 cu. yd. cast front inserted tooth dipper, 50-ft. box type crane boom. Air starter. Good condition. Located Newark. Box 718-SS.

BUCYRUS-ERIE 31-B — 1 YARD STEAM shovel. Located Lawrence, Mass. Make an offer. Box 1092-SS.

BUCYRUS-ERIE 32-B—Gasoline chain crowd shovel. Electric starter. Single shaft cats. Wisconsin 6-cylinder 5"x6" engine. Few minor repairs needed. Otherwise excellent condition. Located near Boston. Box 2062-SS.

BUCYRUS-ERIE 31-B — 1 YARD STEAM SHOVEL. Located Tennessee. Box 1093-SS.

BUCYRUS-ERIE — GA-2 — GAS-AIR — extra high lift shovel, 24' boom, 16' dipper handle, 1-yard dipper. Air starter. Mass. air tanks. Single shaft caterpillar. Located Massachusetts. Box 1121-SS.

BUCYRUS-ERIE—31-B STEAM SHOVEL. 22' boom, 15' dipper handle, 1-yard dipper. Now operating, can be demonstrated. Located Alabama. Box 1130-SS.

BUCYRUS-ERIE—Type B-2 Steam Shovel. Reasonably good condition. Located near Boston. Box 1156-SS

BUCYRUS-ERIE—30-B Electric Shovel. Suitable for power supply. 3 Phase, 60 Cycle, 440 Volt. Machine equipped with 3 motors. Said to be in first class operating condition. Located New Jersey. Box 1162-SS

LORAIN—MODEL 60—1-YARD shovel. Located Southern Virginia. Box 1182-SS

MARION MODEL 7, 1-yard steam shovel. Has not operated in the past five years. New flues recently installed in boiler. Located Buffalo, New York. Box 2006-SS.

NORTHWEST — MODEL 105 — GASOLINE shovel and clamshell—1-yard. Located Massachusetts. Box 1123-SS.

P&H MODEL 600A Gas 1-yard Shovel and 40' boom crane. Electric starter and lights. Waukesha 4 cylinder 6"x7" Model J. L. engine. $1500 recently spent overhauling. Good condition and appearance. Located Central Wisconsin. Box 2084-SS.

P&H MODEL 600. 1-yard gas shovel. 23' boom. 16'9" dipper handle. 1-yard dipper. Waukesha 4-cylinder 6"x7" engine. New type internal clutches, fuel pump instead of vacuum pump. Good condition except few minor repairs needed. Located Chicago. Box 2040-SS.

P. & H. MODEL 600—1-YARD GAS SHOVEL and 40' boom clamshell. Waukesha JL-6"x7" Engine. Located North Carolina. Box 1095-SS.

P & H—MODEL 600, 1 YD. SHOVEL and dragline. Shovel boom 19'6". Dragline boom 40'. Drag bucket included. Waukesha engine. Good condition. Located Central Illinois. Box 1102-SS.

1¼-YARD

BUCYRUS-ERIE GA-3 Gas Air 1¼-yd. shovel. Waukesha 4-cylinder 6¾"x8" engine. Good operating condition. Now operating Arizona. Box 2090-SS.

BUCYRUS-ERIE GA-2 Gas-Air 1¼-yd. shovel. Waukesha 6½"x8" engine. Single shaft cat. General appearance and condition good. Located North Carolina. Box 2108-SS.

BUCYRUS-ERIE. GA-2, Gas-Air. 1¼-yard shovel. Electric starter. Waukesha W.L. 4-cylinder 6¼"x8" engine. Single shaft cat. Extensively repaired recently. Located Texas. Box 2030-SS.

BUCYRUS-ERIE GA-2—Gas-Air shovel. 22'6" boom—16' dipper handle—1¼-yd. dipper. Shop No. 10761. Has had very little use and is in very good condition. Located Maryland. Box 2060-SS.

BUCYRUS-ERIE E-2 shovel and dragline. 1½-yard Plate dipper. 45' boom plus 10' extension. 1¼-yard Page drag bucket. Electric light plant. Atlas Diesel engine. Engine overhauled since last used. Balance of machine good operating condition, except minor repairs needed. Located Louisiana. Box 2053-SS.

BUCYRUS-ERIE—GA-2 Gas-Air High Lift Shovel. 24-ft. boom, 16-ft. dipper handle, 1¼-yard dipper. Located Virginia. Box 1063-SS.

BUCYRUS-ERIE—GA-2 Gas-Air 1¼ yd. shovel. 45' boom clamshell machine. Single Shaft Cat. Recently overhauled by owner. Located New York. Box 997-SS.

BUCYRUS-ERIE—GA-2 Gas-Air—1¼ high lift shovel. Single Shaft Cat. Electric Starter. Reported good operating condition. Located Eastern Pennsylvania. Box 998-SS.

TWO—BUCYRUS-ERIE—GA-3, GAS-AIR 1¼-yard shovels, Wisconsin D-2—6 cyl. 5¼"x6½" Engines. Good condition. St. Paul, Minnesota. Box 1097-SS.

BUCYRUS-ERIE 41-B — 1¼-YARD STEAM SHOVEL. Located near Boston. Electric light plant. Very good price. Box 1096-SS.

BUCYRUS-ERIE—41-B—STEAM SHOVEL. 21' boom, 15' dipper handle, 1¼-cubic yard dipper. Now operating. Will demonstrate. Located Alabama. Box 1131-SS

BUCYRUS-ERIE GA-3 Gas-Air 1¼-yard shovel. Electric starter. Steel cab. Single shaft Cat. Said to be in very good mechanical and operating condition. Located San Francisco. Box 1191-SS.

If You Do Not Find What You Want Listed—Write Us

EXCAVATING engineer
South Milwaukee, Wis.

BUCYRUS-ERIE GA-2—Gas-Air 1¼-yard high lift shovel. Electric starter. Single shaft cat. Massachusetts air tanks. Waukesha 4-cylinder 6¾"x8" engine. Good operating condition. Located Vermont. Box 2065-SS.

BUCYRUS-ERIE GA-2—Gas-Air 1¼-yard extra high lift shovel. Electric starter. Single shaft cat. Massachusetts air tank. Waukesha 4-cylinder 6¼"x8" engine. Located Maine. Good operating condition. Box 2066-SS.

BUCYRUS-ERIE GA-3—Gas-Air 1¼-yard high lift shovel and 45' boom clamshell machine. Electric starter. Single shaft cat. Waukesha 4-cylinder 6¼"x8" engine. Few minor repairs needed. Otherwise excellent condition. Located New Jersey. Box 2058-SS.

KOEHRING MODEL 501 1¼ yard gas shovel. Available about August 15. Located New Mexico. Box 879-SS.

LIMA MODEL 101. 1¼-yard gas shovel. Located Lampasas, Texas. Box 2027-SS.

LIMA MODEL 101. 1¼-yard gas shovel. Located New Braunfels, Texas. Box 2029-SS.

LIMA MODEL 101. 1¼-yard gas shovel. Located Catarina, Texas. Box 2028-SS.

LIMA MODEL 101. 1¼-yard gasoline shovel. 26' boom. 17' dipper handle. Waukesha Model J. K. 6½"x7" engine. Recently rebuilt. Excellent condition. Located Texas. Box 2042-SS.

2 MARION Model 450—Steam Shovels. Good condition. Located Connecticut. Box 1154-SS.

MARION TYPE 32 STEAMER. Shop No. 5676, 18-ft. boom, 15-ft. dipper handle, 1¼-cu. yd. Recently overhauled. Box 451-SS.

MARION MODEL 32—1¼-yd. steam shovel. Boiler inspected February 1, 1938. Machine in good condition. Located Eastern Pennsylvania. Box 2101-SS.

NORTHWEST MODEL 104, gasoline 1¼-yd. shovel and crane. Located State of Washington. Available March 1. Box 2018-SS.

OSGOOD — HEAVY DUTY — 1¼-yard Steam Shovel. Said to be in good working condition. Will sell on terms. Located Virginia. Box 1061-SS

OSGOOD. 1¼-yard gasoline shovel. 1-yard dipper also available. 4-cylinder Leroi gas engine. Only operated three months since $2,000 repairs applied. Excellent condition. Located Texas. Box 2043-SS.

1½-YARD

BUCYRUS-ERIE 37-B Gas 1½-yd. shovel. Electric starter and battery lights. Gasoline fuel pump. Wisconsin 6-cylinder 5½"x6½" engine. Machine rebuilt 1935. Good working condition. Located Eastern Pennsylvania. Box 2091-SS.

BUCYRUS-ERIE—42-B STEAM shovel. 1½-yard Vanderhoef quarry dipper. Very good mechanical condition. Can be demonstrated. Located Georgia. Box 1149-SS.

FOR SALE

Address all box numbers c/o EXCAVATING engineer . . . . . at South Milwaukee, Wisconsin

SMALL SHOVELS
Under 2 Yards continued

BUCYRUS-ERIE 37-B—1½ yard Chain crowd gas shovel. Wisconsin D-3 engine. Located Minnesota. Box 2075-SS.

OSGOOD—VICTOR—GAS 1½ YD. SHOVEL & Clamshell. Shovel boom 23'. Clamshell boom 50'. Wisconsin D-4—6 cylinder 5¾"x6½" engine. Reported excellent condition. Located Minneapolis. Box 1111-SS.

1¾-YARD

BUCYRUS-ERIE 43-B Gas combination shovel and dragline. Shovel dipper 1¾ yd. Dragline boom 60'. 1½-yd. drag bucket. Long axles. 33" treads. Electric starter. Wisconsin 6-cylinder 6"x7" engine. Good operating condition. Located Eastern Pennsylvania. Box 2092-SS.

BUCYRUS-ERIE 43-B—Diesel shovel. 2 yard dipper. Caterpillar Diesel D13000 engine. Reported good operating condition. Located New Mexico. Box 2074-SS.

BUCYRUS-ERIE 43-B late model 1¾-yd. chain crowd shovel. Electric starter. 1½ K.W. Kohler light plant. Buda-Lanova 6-cylinder 5¼"x7" Diesel engine. Located Central New York State. Excellent condition. Box 2019-SS.

5—MARION MODEL 37, 1¾ yard steam shovels, steel cab. Good working condition. Located Minnesota. Box 826-SS.

2-YARD

MARION MODEL 480—2-yd. Steam shovel. Vertical boiler. Boiler inspected February 1, 1938. Excellent condition. Located Eastern Pennsylvania. Box 2102-SS.

SMALL DRAGLINES
Under 2 Yards

½-YARD

MEAD-MORRISON, ½-yard 35' boom dragline and gas shovel, including ½-yd. Page drag bucket. Good operating condition. Located Minnesota. Box 2081-SD.

⅝-YARD

BYERS MODEL 128. ⅝-yd. Gas dragline 35' boom including ½-yd. Page "C" drag bucket. 4-cylinder Diamond T engine. Engine overhauled 1937. Good operating condition. Located Illinois. Box 2087-SD.

KOEHRING—⅝-yd. combination dragline and clamshell. 35' plus 5' extension boom. 4-cylinder Wisconsin engine. Good condition and appearance. Located Florida. Box 2106-SD.

¾-YARD

LORAIN MODEL 40—¾-yd. Gas shovel. 16 mo. old. Excellent condition. Located Eastern Pennsylvania. Box 2103-SS.

NORTHWEST MODEL 105 GAS—40' boom dragline and clamshell, including Page "C" drag bucket. Climax engine. Reasonably good operating condition. Located Atlanta, Ga. Box 995-SD.

OSGOOD — GASOLINE — COMBINATION dragline, clamshell and shovel equipped with electric starter. 40' dragline and clamshell boom. Shovel boom 19'6" dipper handle 14'; dipper 1 yard standard and 1½ beet loading type. Fair condition, good appearance. Located Colorado. Box 1018-SD.

OSGOOD. COMMANDER. Combination dragline, shovel and clamshell. 35' dragline and clamshell boom. ¾-yard Page drag bucket. ¾-yard Rock Type dipper. Hercules 6-cylinder 4⅛"x4½" engine. Completely rebuilt recently and new engine installed. Bucket very good. Will sell on terms. Located Texas. Box 2038-SD.

BUCYRUS-ERIE—1035—40' BOOM GASOLINE dragline and clamshell, including 1-yard dragline and clamshell buckets. 26" caterpillar treads. Recently overhauled. Located Colorado. Box 1118-SD.

⅞-YARD

P&H MODEL 206-B combination dragline and clamshell. 40' boom. Waukesha engine. Good condition and appearance. Located Florida. Box 2105-SD.

1-YARD

BUCYRUS-ERIE 32-B gas combination dragline, clamshell, lifting crane and chain crowd shovel. Electric starter. Wisconsin high altitude engine. Considerable quantity spare parts available. Located South Dakota. Box 2098-SD.

BUCYRUS-ERIE 32-B Gas 50' boom dragline and 1-yd. "U" Drag bucket. Electric starter. Wisconsin engine. Good operating condition. Located Eastern Pennsylvania. Box 2088-SD.

BUCYRUS-ERIE D-2 40' Boom Diesel Dragline. 1½-yd. Light weight drag bucket. Kohler Light plant. Atlas engine. Fairly good operating condition. Located Northern Texas. Box 2086-SD.

BUCYRUS-ERIE DA-2 DIESEL-AIR 40' BOOM dragline. No bucket. Atlas Diesel engine. Located Eastern Pennsylvania. Box 872-SD.

BUCYRUS-ERIE — D-2 — DIESEL DRAGLINE. Atlas engine. Located Texas. 40' Boom, 1¼ yd. Page Bucket. Field reconditioned. Available about September 15. Excellent mechanical and operating condition. Box 1020-SD.

If You Do Not Find What You Want Listed—Write Us
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P & H MODEL 600, 1 YD. DRAGLINE and shovel. Dragline boom 40'. Shovel boom 19'6". Drag bucket included. Waukesha engine. Good condition. Located Central Illinois. Box 1102-SD.

1¼-YARD

BUCYRUS-ERIE E-2 dragline and shovel. 45' boom plus 10' extension. 1¼-yard Page drag bucket. 1½-yard plate dipper. Electric light plant. Atlas Diesel engine. Engine overhauled since last used. Balance of machine good operating condition, except minor repairs needed. Located Louisiana. Box 2053-SD.

BUCYRUS-ERIE 34-B—45' boom dragline. Atlas Diesel 6-cylinder engine. Excellent condition. Located Northern California. Box 2097-SD.

P & H—MODEL 210—55' boom dragline including 1¼-yard Page bucket. Gas powered. Located South Dakota. Box 1172-SD

1¾-YARD

BUCYRUS-ERIE 43-B gas combination dragline and shovel. Dragline boom 60'. 1½-yd. drag bucket. Shovel dipper 1¾ yd. Long axles. 33" treads. Electric starter. Wisconsin 6-cylinder 6"x7" engine. Good operating condition. Located Eastern Pennsylvania. Box 2092-SD.

NORTHWEST. Type M—Gas Dragline. 40' plus 10' Extension Boom. 1¾-yard Omaha Bucket—nearly new. Recently put in good repair. Located Missouri. Box 1161-SD.

2-YARD

BUCYRUS-ERIE 45-B Diesel Dragline. 75' boom. Buda DC-27 6-cylinder 6¼"x8¾" engine. Electric starter. 2¼ yd. Omaha drag bucket. Long cat side frame. Kohler light plant. Good operating condition. Located Nebraska. Box 2111-SD.

SMALL CLAMSHELLS AND CRANES
Under 2 Yards

⅜-YARD

BAY CITY—⅜-YARD GAS CLAMSHELL. Located near Boston. Box 1084-SCC.

BUCYRUS-ERIE 10-B GAS—combination clamshell, shovel and drag shovel. 14" Cat. treads. Hercules 6-cyl. engine. Good condition. Favorable price. Located Central N. Y. State. Box 2000-SCC.

½-YARD

BUCYRUS-ERIE — TYPE A, ½-yard steam clamshell and shovel. 26' clamshell boom. Cat. mounted. Located Central Illinois. Box 2007-SCC.

BROWNING—½-YARD GASOLINE clamshell and shovel. Clamshell boom 30' plus 10' extension. Clamshell bucket included. Located Maine. Box 1115-SCC.

BYERS-BEARCAT gasoline combination crane, skimmer scoop and back hoe. Williams Clamshell bucket included. Located Eastern Pennsylvania. Box 957-SCC.

⅝-YARD

P & H MODEL 204. 35' boom gasoline clamshell. ⅝-yard Kiesler clamshell bucket. Waukesha engine. New cab. Generally very good condition. Located Chicago. Box 2036-SCC.

BUCYRUS-ERIE 19-B gas combination ⅝-yd. 45' boom clamshell and shovel. Hercules 6-cylinder 4"x4½" engine. Used less than 1 year. Excellent condition. Located Southern Indiana. Box 2099-SCC.

KOEHRING—⅝-yd. Combination clamshell and dragline. 35' plus 5' extension boom. 4-cylinder Wisconsin engine. Good condition and appearance. Located Florida. Box 2106-SCC.

¾-YARD

BUCYRUS-ERIE—TYPE B, ¾-yard, 40' boom steam clamshell and shovel. Cat. mounted. Located Buffalo, New York. Box 2005-SCC.

BUCYRUS-ERIE 1030 gasoline clamshell and shovel 35' clamshell boom and Owen "M" Model 230 clamshell bucket. 23' shovel boom. 15' dipper handle. ¾ yard dipper. Wisconsin B-3 gasoline engine. Cylinder blocks recently rebored. Machine in fair condition. Located Massachusetts. Box 982-SCC.

BUCYRUS-ERIE TYPE B STEAM combination clamshell, shovel and steam hoe. Machine completely rebuilt 1929. Good operating condition. Located near Boston. Box 517-SCC.

BUCYRUS-ERIE—TYPE B Steam clamshell and shovel. 40' clamshell boom. 19'9" shovel boom—16' dipper handle—¾-yard dipper. Also Ford truck with 500-gallon steel water tank and pump. Reported to be in good operating condition. Located New Hampshire. Box 1164-SCC.

BUCYRUS-ERIE TYPE B. steam, ¾-yard 36' boom clamshell and shovel, including ¾-yard Williams clamshell bucket. Located Central New York. Box 1188-SCC.

NORTHWEST MODEL 105 GAS—40' boom clamshell and dragline, including Page "C" drag bucket. Climax engine. Completely reconditioned. Located Atlanta, Ga. Box 995-SCC.

NORTHWEST MODEL 105, combination clamshell and shovel. 40' clamshell boom. Type "C" Lakewood 1-yard clamshell bucket. 24' shovel boom. 17½' dipper handle. ¾-yard dipper. Twin City gasoline engine. Reasonably good condition. Located near Chicago. Box 2045-SCC.

OSGOOD — GASOLINE — COMBINATION clamshell, dragline and shovel equipped with electric starter. 40' clamshell and dragline boom. Shovel boom 19'6"; dipper handle 14'; dipper 1 yard standard and 1½ beet loading type. Fair condition, good appearance. Located Colorado. Box 1018-SCC.

FOR SALE

Address all box numbers c/o EXCAVATING engineer . . . . . at South Milwaukee, Wisconsin

⅞-YARD

BUCYRUS-ERIE — 1035 ELECTRIC clamshell. 35' boom. ¾ yd. Haiss Coal loading bucket. General Electric motor, 40 H.P. 3 phase. 60 cycle, 220 volt induction motor. Machine in excellent condition. Located New York. Box 1101-SCC.

BUCYRUS-ERIE—1035—40' BOOM GASOLINE clamshell and dragline, including 1-yard clamshell and dragline buckets. 26" caterpillar treads. Recently overhauled. Located Colorado. Box 1118-SCC.

OSGOOD. COMMANDER. Combination clamshell, dragline and shovel. 35' clamshell and dragline boom. ¾-yard Page drag bucket. ⅝-yard Rock Type dipper. Hercules 6-cylinder 4⅛"x4½" engine. Completely rebuilt recently and new engine installed. Bucket very good. Will sell on terms. Located Texas. Box 2038-SCC.

P&H MODEL 206-B Combination clamshell and dragline. 40' boom. Waukesha engine. Good condition and appearance. Located Florida. Box 2105-SCC.

1-YARD

BUCYRUS-ERIE GA-2 COMBINATION shovel and clamshell. 24' boom, 18'4" dipper handle —1 cu. yd. cast front inserted tooth dipper. 45' boom. Complete clamshell equipment including 1 yard Williams Fav. Clamshell bucket. Air starter. Single shaft cat. Waukesha 4 cylinder 5¾"x8" gas engine. Fair operating condition. Located Eastern Pennsylvania. Box 932-SCC.

BUCYRUS-ERIE — GA-2 — GAS-AIR 45' Boom Clamshell Machine. Good Operating Condition. Located St. Paul, Minn. Box 1024-SCC.

BUCYRUS-ERIE GA-2 CRANE AND SHOVEL. 50-ft. box type crane boom. 22 ft. 6 in. shovel boom, 16-ft. dipper handle, 1 yard cast front inserted tooth dipper. Air starter. Good condition. Located Newark, N. J. Box 718-SCC.

BUCYRUS-ERIE — GA-2 GAS AIR Clamshell. 45' boom. Single Shaft Caterpillar. Waukesha 4 cylinder 6¼"x8" engine. Rebuilt since original manufacture. Good operating condition. Located New Jersey. Box 1104-SCC.

BUCYRUS-ERIE—1035—GASOLINE 40' BOOM clamshell. Machine including 1-yard Owen clamshell bucket. Single shaft caterpillar. 24" treads. Located Massachusetts. Box 1120-SCC.

NORTHWEST—MODEL 105—gasoline clamshell and shovel—1-yard. Located Massachusetts. Box 1123-SCC.

BUCYRUS-ERIE 32-B gas combination clamshell, dragline and chain crowd shovel. Electric starter. Wisconsin high altitude engine. Considerable quantity spare parts available. Located South Dakota. Box 2098-SCC.

P. & H. MODEL 600—40' BOOM GAS clamshell and 1-yard shovel. **Waukesha JL-6"x7"** Engine. Located North Carolina. Box 1095-SCC.

P&H MODEL 600A 1-yard 40' boom crane and gas shovel. Electric starter and lights. Waukesha 4-cylinder 6"x7" Model J. L. engine. $1500 recently spent overhauling. Good condition and appearance. Located Central Wisconsin. Box 2084-SCC.

1¼-YARD

BUCYRUS-ERIE GA-2 Gas-Air clamshell and shovel. 45-ft. clamshell boom. 1¼-yd. shovel. Single shaft cat. Recently overhauled by owner. Located New York. Box 997-SCC.

BUCYRUS-ERIE GA-3 — Gas-Air 1¼-yd. 45' boom clamshell and high lift shovel. Electric starter. Single shaft cat. Waukesha 4-cylinder 6¼"x8" engine. Few minor repairs needed. Otherwise excellent condition. Located New Jersey. Box 2058-SCC.

BUCYRUS-ERIE 41-B Steam Crane. 55' boom. Equipped for pile driving. Oil burner. Boiler flues replaced 1936. Fair condition. Located vicinity Chicago. Box 2089-SCC.

LINK-BELT. MODEL K-2. Gas crane. 50' boom. Also 2 extra 20' inserts to make 90'. Weight 67,000 lbs. Located St. Paul, Minn. Box 2013-SCC.

NORTHWEST MODEL 104, gasoline 1¼-yard crane and shovel. Located State of Washington. Available March 1. Box 2018-SCC.

BROWNING MODEL 25-T Steam locomotive crane—8-wheel truck mounted with outriggers. Capacity 48,000 lbs. at 15' radius. 50' boom. 1¼-yd. Williams clamshell bucket included. Vertical boiler. 125 lbs. working pressure. Inspected November 1937. Approved for use Pennsylvania, New York and New Jersey. Located Eastern Pennsylvania. Box 2112-SCC.

1½-YARD

BUCYRUS-ERIE. 37-B Electric 50' boom clamshell. Long cats. 24" treads. Sixgle motor. 60 H.P. 220 volt, 3 phase, 60 cycle. Good condition. Located New York. Box 2052-SCC.

OSGOOD—VICTOR—GAS 1½ YD. clamshell & shovel. Clamshell boom 50'. Shovel boom 23'. Wisconsin D-4—6 cylinder 5¾"x6½" engine. Reported excellent condition. Located Minneapolis. Box 1111-SCC.

LARGE SHOVELS AND DRAGLINES
2 Yards and Over

BUCYRUS-ERIE 52-B Ward Leonard Electric shovel. 30' boom 18' dipper handle 2¼-yd. dipper. 3 motors—3 phase 60 cycle 2300 volt. 2 flood lights. Very good condition. Located Eastern Pennsylvania. Box 2093-LSD.

BUCYRUS-ERIE 52-B Ward Leonard Electric combination shovel and dragline. 30' shovel boom 18' dipper handle 2¼-yd. dipper. 70' boom dragline equipment and 2¼-yd. drag bucket. 3 motors—3 phase 60 cycle 2300 volt. 2 flood lights. Very good condition. Located Eastern Pennsylvania. Box 2094-LSD.

BUCYRUS-ERIE 50-B Diesel Combination shovel and dragline. New 1¾-yd. Esco dipper. 50' dragline boom including 1½-yd. Page drag bucket. Atlas 4-cylinder 9"x12" engine. Good working condition. Located Montana. Box 2107-LSD.

BUCYRUS-ERIE 50-B, 2-yd. steam shovel. Good operating condition. Located Central New York State. Box 2020-LSD.

BUCYRUS-ERIE 100-C. 3-yard steam shovel. Cat. mounted. Fair condition. Located Kansas. Box 2049-LSD.

BUCYRUS-ERIE 95-C. 3-yard steam shovel. Cats. installed 1925. Fair condition. Located Kansas. Box 2050-LSD.

MARION MODEL 60. 2½-yard steam shovel on railroad trucks. Good appearance and condition. Located Kansas. Box 2051-LSD.

1½-T MONIGHAN WALKER. Diesel power. 2 yard bucket, 60-foot boom. Good condition. Reasonably priced. Located Kansas. Box 742-LSD.

CLASS 320 STEAM DRAGLINE, 144-foot boom. 8-yard bucket. Located on Illinois river. A good buy. Box 750-LSD.

CLASS 230 STEAM DRAGLINE. 175-foot steel and aluminum boom. 6-yard RED ARCH bucket. Ready to work. Located near New Roads, Louisiana. Box 751-LSD.

PRICE VERY ATTRACTIVE

BUCYRUS-ERIE 50-B STEAM combination shovel and dragline, shop number 10577. 26' boom, 17' dipper handle, 2 yd. dipper. 50' boom dragline equipment, 1¾ yd. Page bucket. 1 KW 32 volt Moon electric light plant. 54"x9"7" standard coal burning locomotive-type boiler. Also 2 steel underframe flat cars on which machine is now loaded. New 1929. Moved only 250,000 yards of material. Excellent condition. Price very attractive. Located Kansas City, Mo. Deal direct with owner. Box 900-LSD

2-T MONIGHAN WALKER, 3½-yard bucket. 70 foot boom. Good condition. Reasonably priced. Located Kansas. Box 743-LSD.

70-C BUCYRUS STEAM SHOVEL on Cats. Complete. In operating condition. Shop number 1712. Also one extra three-yard Manganese dipper and sticks. Chicago territory. Box 347-LSD.

CLASS 14 STEAM DRAGLINE, 60' boom. 2 cubic yard Page bucket. Locomotive-type boiler. Thoroughly overhauled and ready for service. Located, Iowa. Box 771-LSD.

2—BUCYRUS-ERIE 100-B steam shovels, worked only 15 months. Also, 2 Ingersoll-Rand Diesel compressors. Very low prices for immediate sale. H. W. Nelson, 1 Wall St., New York.

TWO 3-W MONIGHAN WALKERS, 3½ yards. 70- and 77-foot booms. Good condition. Reasonably priced. Located Louisiana. Box 745-LSD.

BUCYRUS 320-B STEAM STRIPPING shovel, shop number 4205, new in 1925, used less than four years. Located at Toronto, Ohio. Box 74-LSD.

2-W MONIGHAN WALKER, 2½ yard capacity 70-foot boom. Good condition. Priced reasonably. Located Louisiana. Box 744-LSD.

P&H MODEL 900, 3½ yard Diesel Shovel, 33-foot boom, 200 h.p. Fairbanks-Morse engine. Mounted on caterpillars. Box 828-LSD.

BUCYRUS-MONIGHAN 4-W Walking dragline, 80' boom 5½ yard Page bucket, 30' boom insert and 4-yard bucket. Located Tennessee. Box 844-LSD.

ANY FAIR OFFER ACCEPTED

Class 24 steam dragline. 100 foot boom, 5 cubic yard buckets. Skid and roller mounted. Rebuilt 1927 at a cost of $15,000. New locomotive boiler installed 1928. Will accept any fair offer. Located near Fort Worth, Texas. Box 823-LSD.

BUCYRUS-MONIGHAN MODEL 6160—Diesel Dragline. 160' boom. 6-yard drag bucket. Fairbanks-Morse Diesel engine. $15,000 extras added since machine was recently purchased. Will rent. Located Montana. Box 2068-LSD.

BUCYRUS-ERIE — TOWER EXCAVATOR. 130' head tower. 50' tail tower. 12-yard bottomless bucket. Electrical equipment 3 phase 60 cycle 4000 volts Ward Leonard. WILL RENT. Located Louisiana. Box 2069-LSD.

BUCYRUS-ERIE — 55-B — DIESEL SHOVEL. 27'6" Boom, 18' Dipper Handle, 2½ yard Dipper. Atlas Diesel Engine. New 1935. Excellent mechanical and operating condition. Located Oregon. Box 1036-LSD.

BUCYRUS-ERIE — 52-B — DIESEL 2¼ yard Shovel and Dragline. Atlas engine. Good condition. Located Eastern Pa. Box 1039-LSD.

BUCYRUS-ERIE — 100-B — STEAM SHOVEL. 3 yard Dipper. Revolving machinery, very good condition. Located Montreal, Canada. Box 1041-LSD.

BUCYRUS-MONIGHAN—MODEL 4-T — 4-yard Diesel Dragline. 110' Boom. Good Condition. Located Nebraska. Box 1047-LSD.

BUCYRUS-ERIE 50-B Steam Shovel. 30' boom, 24' dipper handle. 1 each 1½-yard and 2-yard dippers. Very good condition. Located near Albany, New York. Box 2085-LSD.

BUCYRUS-ERIE 50-B Diesel Dragline. 50' boom. 2-yard Page "M" drag bucket. Kohler Light Plant. Atlas Engine. Overhauled completely 1937. Actually used only 4 years. Good condition. Located Illinois. Box 2083-LSD.

BUCYRUS-ERIE 175-B 2 Motor AC Electric Dragline. Truck Mounted. 125' boom. 1 each 4-, 5-, and 6-yd. drag buckets. Chain drive from main motor to intermediate shaft. Extra rotors for main and swing motors and other spare parts. 3—75 KVA 60 cycle 2200/220/440 volt transformer mounted on machine. Power supply 3 phase 60 cycle 440 volt. Completely overhauled since received from factory. First class operating condition. Located Kansas. Box 2082-LSD.

BUCYRUS-ERIE 5-W Diesel Dragline. 90' Boom. Electric swing. Vortex Air Oil Cleaners. Electric fan in operators platform. 5-yd. "Y" drag bucket. Fairbanks Morse 250 HP Type 33-D 5-cylinder 10"x10½" pump scavenging engine. Auxiliary Waukesha gas engine. Good working condition. Located Colorado River Aqueduct near Indio, Cal. Available March 15. Box 2079-LSD.

FOR SALE

Address all box numbers c/o EXCAVATING engineer . . . . . at South Milwaukee, Wisconsin

LARGE SHOVELS AND DRAGLINES
2 Yards and Over continued

BUCYRUS-MONIGHAN 5-W Diesel Dragline. 80' Boom. Electric swing. Vortex Air Oil Cleaners. Electric fan in operator's platform. 6-yd. "Y" drag bucket. Fairbanks Morse 250 HP Type 33-D 5-cylinder 10"x10½" pump scavenging engine. Auxiliary Waukesha gas engine. Good working condition. Located Colorado River Aqueduct near Indio, Cal. Available March 15. Box 2080-LSD.

MARION—MODEL 350—8 yard Electric Shovel. Power equipment, 3 Phase, 60 cycle, 2300 volt—Ward-Leonard Control. Mounted on railway trucks. Good condition. Located Minnesota. Box 1049-LSD.

MARION—MODEL 70—3½ yard Electric Shovel. Railway truck mounted. Power Equipment, 3 Phase, 60 cycle, 2300 volt. Good condition. Located Ohio. Box 1050-LSD.

PAGE—MODEL 220—2½ yard Diesel Dragline. 85' Boom. Good operating condition. Located Iowa. Now operating. Box 1052-LSD.

BUCYRUS-MONIGHAN 3-T DIESEL dragline. 80-ft. steel boom, 8 cu. yd. drag bucket, 120 h.p. Fairbanks-Morse type "YVA" engine. 1500 watt Kohler light Plant. Located bank Illinois River. Box 1056-LSD.

BUCYRUS-ERIE — 75-B Electric Combination Shovel and Dragline. 29-ft. shovel boom, 20-ft. dipper handle, 2½-yard dipper, 85-ft. dragline boom with mast suspension. Suitable for power supply, 3 phase, 60 cycle, 2300 volt. Induction motors. Said to be in excellent working condition. Located Eastern Pennsylvania. Box 1058-LSD.

BUCYRUS-ERIE 50-B — 2-yard Steam Shovel. Located Texas. Low Price. Box 1059-LSD

BUCYRUS-ERIE 55-B—Extra High Lift Diesel Shovel. 35-ft. boom. 22-ft. dipper handle, 2 cu. yd. Bowl Door dipper. Caterpillar mounted. Kohler light plant. Atlas Diesel engine. Used about three months. Just like new. Located Eastern Pennsylvania. Box 1069-LSD.

PAGE—MODEL 220 — Electric dragline. 90' boom, 3½-yard Page R.C. drag bucket. Box 1124-LSD

BUCYRUS-ERIE—CLASS 24 DIESEL dragline. 130-ft. boom, 4 cu. yd. bucket. Truck mounted. 165 h.p. Anderson Diesel engine. Friction drive. Said to be in good operating condition. Located on Mississippi River near New Orleans convenient for loading on barge. Box 1074-LSD.

BUCYRUS-ERIE—175-B TRACK MOUNTED steam shovel. 85' boom, 58' dipper handle, 3½-yard dipper. Good condition except dipper handle and boiler. Bargain. Located near Pittsburg, Kansas. Box 1134-LSD.

LOCOMOTIVES

LOCOMOTIVES

1 Baldwin Locomotive, 17x24, standard gauge, 45-ton, shop No. 33262.
2 Baldwin Locomotives, 19x26, standard gauge, 6-wheel, shop Nos. 39534 and 39536.
4 American Locomotives, 20x26, 60-ton, shop Nos. 5945, 5949, 42354 and 45323.
All of the above have passed State Boiler Inspection yearly; will stand 240 lb. cold water tests. At present are in actual service in Minnesota Mines. Box 1194-ME.

MISCELLANEOUS EQUIPMENT

SHOVEL ATTACHMENT

1½-yard dipper, dipper stick, boom for Link-Belt K-44 shovel. Used only a few months. Excellent condition.
ARMOUR FERTILIZER WORKS
Chicago Heights, Ill.

BABY MACK—DUMP TRUCK. 4-yard Heil Dump body and 3-ton wood coal body. Hi-Lift Heil Hoist. Pneumatic tires all around. Good condition. Located New York. Box 2048-ME.

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NEW ELECTRIC MOTORS AND ACCESSORIES
BARGAIN PRICES

A large variety of power sizes and power characteristics; also switches, controls, etc. Write us your requirements. Box 2100-ME.

1-YARD CLAMSHELL BUCKET

ONE—1-YARD TYPE P.F. Williams clamshell bucket. Complete with weights and teeth. Used two weeks—like new. Box 2110-ME.

FRUEHOFF SEMI-TRAILER with 8' by 40' Deck. (Can be shortened). Single rear axle with 4 wheels each with 36"x10" solid rubber tires. Air Brakes. 16 ton capacity. Excellent condition. Located New York. Box 1160-ME.

DRAG BUCKET

BUCYRUS-ERIE 1½-YARD Type "Y" Drag Bucket. Good condition. Located Kansas. Box 1166-ME

DRAGLINE EQUIPMENT

72-ft. Dragline Boom and Fairlead—Hydraulic Equipment—1 Hoist Drum—1 Drag Drum—1 Boom Suspension, Sway Brace and Suspension Cables. All suitable for application to Bucyrus-Erie Model 75-B Machine. Located Eastern Pennsylvania. Box 1060-ME.

BARGAIN—NEW DIESEL COMPRESSOR

ATLAS DIESEL POWERED portable air compressor, 4 cylinder, 60 H.P. engine of dustproof type, skid mounted, self contained, complete with radiator cooling system. Direct connected to a 320 cubic feet Worthington Feather Valve Compressor. Brand new and a bargain to the first comer. Atlas Imperial Diesel Engine Company, Oakland, Calif.

HAISS EXCAVATOR — C7097, June 1930. Weight 11 tons. Needs new teeth. 83" per minute crowding. Price $1800. Box 990-ME.

CAR TRANSPORTER

CAR-TRANSPORTER or stacker with reach of 135' and dumping height of 75'. Equipped with 4-yard aluminum car. Caterpillar-mounted and suitable for use with shovel having per hour output of 250 yards. Electric drive, 3-phase, 60-cycle, 4000-volt current. This car transporter is in excellent condition and priced to sell. Located near Kansas City, Missouri. Box 2010-ME.

SHOVEL EQUIPMENT—Late design—suitable for Bucyrus-Erie 52-B Diesel. Only handled about 4,000 yards material. Equipment located Alabama. Box 1113-ME

FRONT FOR 32 MARION

1⅛ CU. YD. shovel front end—new dipper—for Marion 32 steamer. Priced right. Located near Chicago. Box 857-ME.

USED CONTRACTORS EQUIPMENT

1—Model 100 Lincoln Revolver with 100' boom and 12' Gantry.
2—275 Koehring Mixers with Electric motors.
1—200-ton Blaw-Knox Bin with weighing batchers, cement scale and push button control.
1—Robinson Pneumatic cement unloader with silo.
1—20-ton Whitcomb Gasoline Dinkey, overhauled.
4—18-ton Steam Dinkeys, overhauled.
12—30-yd. Western Lift Door Air Dump cars.
4—30-yd. Koppel Drop Door Air Dump cars.
26—16-yd. K. & J. Lift Door Air Dump cars.
6—20-yd. K. & J. Lift Door Air Dump cars.
5—2-cu. yd. Blaw-Knox Roller gate Concrete Buckets.
7—70-ton 20x36 Baldwin Switchers.
3—Jordan spreaders excellent condition.
Located Mississippi valley. Box 2011-ME.

INDUSTRIAL STEAM WRECKING DERRICK. Non-propel. Rating 50 tons at 20' with outriggers. Located Nebraska. Box 1171-ME

ONE—8-INCH DE LAVAL PUMP unit connected to Hercules Power unit. Mounted on pneumatic-tired trailer.
ONE—4-INCH GOULDS CENTRIFUGAL PUMP with Hercules Power unit. One 4-inch foot valve and strainer.
ONE—3-INCH GOULDS DIAPHRAGM PUMP with 2½ H.P. Hercules.
ONE—KOHLER ELECTRIC PLANT. Remote Control, 5-KVA 120-240 volts, single phase, 60 cycle, equipped with a Waukesha 3-inch bore x 4-inch stroke, 4-cylinder gasoline engine.
WRITE PURCHASING AGENT, FEDERAL LAND BANK, LOUISVILLE, KY.

BARBER-GREENE—MODEL B-44 ditcher. Located North Carolina. Box 1180-ME

KOEHRING DRAG SHOVEL equipment for Model 301 machine. Used very little. Low price. Located Eastern New York State. Box 1181-ME

DRAG SHOVEL EQUIPMENT—consisting of 18' boom, 7'6" dipper handle and ¼-yd. front-opening dipper suitable for application to Bucyrus-Erie 1020 shovel. Located Rhode Island. Box 2003-ME.

EUCLID-TUWAY 11-CU. YD. dump wagon. Hydraulic hoist. Worked only 320 hours. Located Central New York State. Box 1189-ME.

ERIE AGGREMETER BIN—80-ton capacity with 3 compartments, including weighing scales. Only handled 10,000 tons. Located Central New York State. Box 1190-ME.

MINING AND QUARRY EQUIPMENT

The following equipment is located in Minnesota. Full details on request.

3—Boilers.
12—36" gauge Koppel double truck flat cars.
6—36" gauge Peteler 4-yard two way dump cars.
4—Swing & Boom engines for Marion 31 & 36 shovels.
1—Austin-Western grader, 8' blade and scarifier.
4—Hoists—Single and double drum.
2—Milwaukee gasoline locomotives, 7-ton 24" gauge.
3—Electric motors, 100 to 150 h.p.
8—Pumps—Steam and gasoline.
1—Special Twin City Tractor.
1—Complete Ainley Placer gold machine.
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CONTRACTORS — ATTENTION — YOUR REPAIR SHOP NEEDS SOME OF THESE TOOLS

2½" Style 3 Pipe Machine for Motor Drive
20" No. 8 Vulcan & Ransom Double Spindle Grinder
60" Pond Radial Drill
Hilles & Jones—No. 000 Punch
48"x48"x12' Pond Planer
42"x36"x8' Niles—Bement—Pond Milling Machine
4500 lb. Fairbanks-Morse—Dormont No. 4 Platform Scale
42"x36"x8' Cincinnati Planer
No. 2 Diamond Single Wheel Wet Grinder
3"x36" Jones & Lamson Turret Lathe
22"x48" Between Centers—Greaves & Klusman Engine Lathe
Box 2063-ME.

WANTED

WANTED

BOOM for Bucyrus-Erie GA-2 shovel, with or without crowding engine. When writing give location, condition and lowest cash price. Box 2109-ME.

WANTED: 36 or 37 Marion Caterpillars. Need caterpillars and axles complete. Must have very low price. Write P. O. Box 168, Pleasanton, Kansas.